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THE

Doctrine of Compound Interest,

ILLUSTRATED AND APPLIED TO PERPETUAL ANNUITIES,
TO THOSE FOR TERMS OF YEARS CERTAIN, TO LIFE-ANNUITIES,
AND GENERALLY TO PROSPECTIVE TRANSACTIONS;

WITH

New and Compendious Tables,

SOLVING THE QUESTIONS THAT DEPEND ON COMPOUND INTEREST, ACCRUING
ANNUALLY, HALF-YEARLY, OR QUARTERLY;

AND

OTHER ORIGINAL TABLES,

EXPRESSING, WITH REFERENCE TO COMPARATIVE SYSTEMS, THE PROBABILITIES AND THE EXPECTATIONS
OF LIFE AT EACH AGE, ALSO THE CORRECT VALUES OF ANNUITIES ON SINGLE
AND ON JOINT LIVES.

" *TEMPUS AGER MEUS.*"

BY

FRANCIS CORBAUX,

Author of " *An Inquiry into the National Debt, and into the Means and the Prospect of its
Redemption, with a Plan for redeeming that Debt, upon the principle
of Terminable Annuities,*" &c. &c.

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ERRATA.

Page 53, *Sect.* XXX. " and , are known"; *read* " and *p*, are known."

Page 61, (XXVII,) *read* (XXXVII.)

Page 62, *At the end of the last line, the word* " it" *is omitted.*

PREFACE.

Our Money Trade embraces the national concerns of the greater part of the civilized world, and exceeds in magnitude any other branch of British commerce. The increased competition in that trade renders it impossible to be prosecuted with advantage, except through great acuteness and a judicious application of mathematical powers. Hence a work destined to remove every difficulty and chance of error in calculation,—by exhibiting at a single glance, and under the consideration of Compound Interest, all the possible relations between Capital and Income,—can scarcely fail to be acceptable to persons engaged in transactions of that description.

The operation of *Compound Interest* has been illustrated by expert calculators, who have published sets of Tables, establishing, with reference to various rates of Interest, the proportions according to which any capital may be improved from year to year,—the comparative value of Capital forthcoming at the expiration of any given number of years,—the value of Annuities for terms of years certain,—and the Capitals susceptible of being formed in process of time, by the savings of Income progressively improved; but the practical utility of those tables is limited, and inadequate to the present demands. They are even inaccurate, as they are founded on a supposition that the Interest of money invariably accrues in one single and annual payment; whereas in almost all cases, especially when Interest is derived from investments in the public funds, and though nominally expressed as an annual prorata, it accrues Half-yearly, and on many occasions is susceptible of accruing by Quarterly instalments: an important consideration by which the series of calculations ought to be governed.

The Tables now offered have reference to certain rates of Interest, between the inclusive limits of *three* and of *six per centum per annum*, proceeding by differences of *one quarter per cent.*; to specific periods, from year to year, until the *hundredth* inclusive, but proceeding as far as the *sixteenth* by successive portions of years; to distinct considerations of the Interest accruing either *annually*, *half-yearly*, or *quarterly*; and according to those data, they immediately solve *six* different questions.—*First*, that of the increase of Capital, supposing it improved by the operation of Compound Interest at a uniform rate; *Secondly*, that of the present value of forthcoming capital, as reduced by the Discount, taken in a converse ratio of the improvement at Compound Interest; *Thirdly*, that of the capital ultimately formed, by a periodical Income accumulated and improved as before mentioned; *Fourthly*, that of the Redemption-fund, or the requisite proportion of annual savings out of any income, in order to create, by means of their accumulation and improvement, the Capital that may be wanted at a prescribed period; *Fifthly*, that of the Capital represented by any annual Income, or the present value of that income, the last instalment of which is forthcoming at the period referred to; *Sixth* and lastly, that of the proportion which an Annuity, terminating at a specific period, should bear with present Capital, for constituting an equivalent.

Besides those principal questions, arising from the data above described, the same Tables further solve, mediately and with the assistance of simple indications, not only a great variety of incidental questions naturally growing out of the general subject, but also those in which the considered rate of Interest may be either higher or lower than the limits assigned to the Tables. These again yield an approximate solution of the questions concerning the Rate of Interest itself, or concerning the specific time, when failing either of those particular data any other may be introduced; such calculations always requiring *three* different data, the third of which is, in the stated answers to the six questions first propounded, implicitly understood to consist of *unity*, whether considered as a present or a future Capital, or as a corresponding Income.

The text is divided into Two Parts, preceded by an Introduction, where some leading and important points are discussed.

The First Part contains an exemplification of all questions to the solution of which the above-mentioned Tables are adequate; and reuniting every consideration relative to the operation of Compound-Interest, referable to periods of time unconditionally determined, it will constitute, in all respects, a complete theory of that branch of knowledge.

The Second Part, exclusively devoted to Life-Annuities, is nearly reduced to an abridgment of what has already been exposed on that subject by authors of great merit, and whose immediate province any attempt to invade could scarcely be justified, except upon grounds not here assumed.

Desirous, however, to extend as far as possible the practical utility of this work, a few more Tables have been superadded; stating from authentic sources, and from observations carefully collected during long periods, the distribution of a whole population into relative quantities of individuals of different ages, and the progression of mortality amongst them, according to a systematic classification of certain general circumstances of human existence. Whence deducing, as indispensable data, the Expectation of life for each respective age, together with the various probabilities attached, whether to a present life's further enduring any determinate period of years, or to the joint continuance of any two or more lives during such period, the questions susceptible of frequent recurrence concerning Life-Annuities are enabled to be solved; and more particularly, the scale of value of those annuities—the ascertainment of which is generally considered to be a matter of some difficulty—is here established, with sufficient accuracy, and under comparative points of view.

As the claim of a production of this kind, to public favour, must chiefly rest upon the correctness of the results set forth, nothing has been spared towards securing this point in the utmost degree. The calculations have undergone a rigorous verification; and typographical errors have, by repeated collations, been sedulously guarded against. If, notwithstanding the extreme care bestowed in these respects, any errors should have escaped detection, (amongst upwards of *thirty thousand* results exhibited,) they will be but few and always confined within the limits of *two units*, at most, of the last decimal figure; errors which could never be of real importance. It may be confidently advanced that the results, as expressed in the Tables, are safely to be confided in for all practical purposes. The means, however, of corroborating their accuracy, are contained in the text that precedes them, and in those developments of mathematical reasoning that properly constitute THE DOCTRINE of COMPOUND INTEREST.

INTRODUCTION.

THAT which is called MONEY, from the latin *moneta*, signifying "*to give notice*," has been invented to serve as a common standard of reference, in expressing the relative values of other commodities; and for facilitating the barter of those commodities, which the money should represent in a general sense.

At an early period of historical record, the more precious metals—*Gold* and *Silver*—were preferably selected for performing that office, in consequence of their apposite properties, such as Solidity, Malleability, and Durability; and also from their comparative uselessness towards the ordinary purposes of life, though not obtainable from the bowels of the earth without a considerable expense of human labour. During many ages, the denominations of Money continued to be identical with those of Weight; and each article of necessity or of commodity was assimilated, in respect to general value, with some quantity of uncoined gold, silver, or even inferior metal. When afterwards these became shaped into *Coin*, the integrity of which was vouched for under public authority, that metallic currency assumed a character, more or less independent of the consideration of *Weight,* and remained liable to be arbitrarily dealt with at the hand of power. For a while, Money was issued as the invariable representative of certain things, and principally Cattle, of which the pieces of coin bore the respective impressions; whence from *pecus* has been derived *pecunia.*

The history of the *Circulating Medium,* which more extensively to retrace would be an unnecessary deviation from our main object, informs us respecting not only the frequent variations that have taken place in the reciprocal valuation of Gold, Silver, and Copper, as established by their coinage at different periods and in different countries; but also respecting the numberless frauds, adulterations, and abuses of every kind, that have been practised from time to time upon the Money-system, by barbarous, crafty, and profligate despotism. Ultimately, and by a prodigious enlargement of that system, the representative metallic currency has admitted its own and boundless representation, by means of *paper* tokens, and sub-tokens, under a certain conception of *Public Credit* that seems not yet to be precisely defined; thus generating various national as well as private abuses, never before imagined, and giving occasion to diversity of opinion respecting the future results of so bold an experiment. The fruitful principle of *Generalization,* though applied with the greatest success to some elevated branches of science, should perhaps not without caution be extended to Political Economy; in which the bias of human propensities, and the versatility of the passions, are to be taken into consideration as combined with other operative causes.

The quantity of money that may be required, for the single purpose of a circulating medium, is confined within limits depending in some degree on the convenience afforded, by the materials, the form and divisions of that money, for the rapidity of its circulation. In large and commercial cities, existing under a liberal and protecting government, and where the transfer of money is likely to be often called for, even in considerable sums at each time, the establishment of Deposit-Banks, of which that of the city of Hamburgh offers a very good specimen, is calculated for promoting that object; the transfer in a general Account-book being operated with much less waste of time, than it could be by a physical delivery from hand to hand. In Great-Britain, that office is imperfectly executed by Banks of circulation and by private Banking-houses, whose transactions are referable to the fictitious currency already mentioned. The best that can be said of our money-system is, that it has hitherto worked its way, notwithstanding great and palpable inconveniences.

Money, from its promiscuous and unequal modes of circulation, has a tendency to accumulate into masses, more or less considerable in different hands. Those masses, during the intervals in which they remain unemployed, assume the denomination of *Capital.*

Increase of Capital is the constant object of Industry and Economy. When the increase of capital, in any country, has attained a certain height, by the profits of an extensive foreign trade, such capital may in process of time form an important branch of the national wealth; but that increase would be unavailable, and its advantages would be neutralized in consequence of a corresponding advance in the prices of all other commodities, if the Capital were not also to acquire a merchantable character, both at home and abroad. Capital, alone, is however a precarious and but a secondary species of wealth. The fate of countries,—as exemplified by Spain, for the last three centuries,—that relinquish creative industry merely to pursue the acquisition of silver and gold, must inevitably be to subsist in a continual and wretched state of dependance upon other countries, for those necessaries and commodities of life, which, being assuredly reproduced in proportion with the demand for their consumption, constitute both the principal source and the real substance of wealth.

Capital, unaided, remains an inert and useless mass. Towards becoming productive, its association with Industry is an indispensable requisite; and then it is entitled to share, with the latter, in the profits derived from their combined powers. The proper destination of Capital is to stimulate industrious pursuits, to favour useful enterprize, to promote beneficial improvements, and ultimately to participate in the various advantages thence resulting. This is the true foundation,—the equitable motive of what is termed *Interest of Money.*

The implied share of profits, appertaining to Capital, is according to established custom compounded for in a certain ratio of the capital employed; which ratio is understood as referable to an annual period, and multipliable in proportion with the quantity of years, or otherwise the mere fraction of a year, during which such employment may continue. What is commonly called *Rate of Interest* is only a different mode of expressing, by duplication of terms, that *ratio* which is a simplified mathematical term; and thus explaining that 3, 4, 5, or any other quantity of money, whatever may be its denomination, is to remunerate the hire or use for one year, of a quantity uniformly expressed—namely *one hundred*—of money similarly denominated and of equal value. The Interest of money, although specified at an annual rate, is payable at such regular periods as may be agreed upon; whether by *Annual*, by *Half-yearly*, or by *Quarterly* instalments, or even at shorter intervals; each payment being always proportionate with the annual rate.

In almost all the money transactions that do not exactly consist in the purchase or the sale of commodities, and more particularly in cases of *Loans* between individual persons, or of those made to Governments under specific contracts; and whether, according to the terms of such contracts, the reimbursement of the capital advanced be secured or not by any real pledge, or whether the loan be made on simple Credit, with a symbolical pledge only; it is to be understood, in those various cases, that the above definition of *Interest* becomes a mere fiction, inasmuch as no association actually takes place between the borrower and the lender, for any purpose common to both parties. Yet all those transactions are uniformly regulated on the principle we have described, because it is obvious that no justifiable motive for borrowing can possibly exist, except upon the supposition of some profitable or truly beneficial purpose contemplated in the intended application of the money.

Transactions that have Interest of money for their object are founded upon what is called *Credit*, or the faith with which the expectation of reimbursement and remuneration is accompanied.

Credit may be yielded either to substantial pledges, to individual persons, to certain societies acting collectively, or to those who are entrusted with the administration of the public finances; and in the latter case, the credit rests on what is usually denominated *Government-Security*. When it is yielded to real pledges, their imperishable character is a requisite no less essential than their adequate value; when to individuals, the estimation of their moral integrity possesses greater weight than the merely external appearances of wealth; and when to societies collectively, their permanency is a paramount consideration. It is the exclusive privilege of these, and especially of Governments, to be susceptible of that permanent character, enabling them confidently to look forward to remote periods for the accomplishment of rational purposes, through the developement of resources almost inexhaustible, and that seldom fail to be supplied by lapse of time aided by a wholesome administration: nevertheless, a decayed state of things, resting its present claims on antecedents only, not unfrequently obtains Credit upon illusory grounds. The concerns of incorporated societies may be so interwoven with the financial system of the Government, as to preclude the separation of their respective credits; that of the former being rendered subordinate to that of the latter, on the faith of which only depends the existence of those societies. *Public Credit* is not, however, the same thing as the credit directly possessed by the Government: it consists in the generality of mutual facilities obtained in money transactions, throughout any country, from a universal feeling of confidence and security, which a wise and a sufficiently protecting government alone can convey. When that foundation is shaken, Public Credit is at an end.

From the natural tendency of things, abstracted from all interference of the civil laws in regulating the Interest of money, the rate of that interest, when freely stipulated between man and man, can be governed by no other than the following three circumstances:—the competition existing in the money-market,—the degree of risk attending any particular investment of capital,—and the more or less facility for reconverting at pleasure into Capital the proposed matter of that investment.

First:—The prices of all commodities being liable to fluctuate, according to the proportions between the supply of and the demand for those commodities at the time being, this circumstance possesses a similar influence upon the value of Capital, considered in its relation with the periodical income it should produce; whence Capital becomes less valuable, under this point of view, in proportion with the increase of that particular description of wealth; and all Interest must cease, where no demand for Capital exists. From these premises we may infer that, in all thriving countries, the Government, as well as the great landed proprietors whose estates are susceptible of improvement, will probably be benefited in consequence of their constantly employing Capital taken at Interest; the rate of which Interest is not unlikely to sustain successive reductions, whilst the nominal Capital, thereafter to be repaid, will probably have sunk a part of its original and comparative value. But in the absence of adequate demand, and of a sufficiently remunerating employment for Capital in the country where it may abound, the deficiency, in that respect, is capable of being supplied by productive employment of that capital in foreign countries; the risk attending which is to be duly appreciated.

This dependance, however, proves that the unlimited increase of Capital,—which is rather the symbol than the reality of wealth,—could not without inconvenience and ultimate disadvantage be aimed at, as the principal means of establishing the strength of a nation, and its permanent influence abroad. Nor does it appear, from the lessons of History, that extensive dominion, when chiefly founded upon commercial advantages and accumulation of wealth, is susceptible of maintenance beyond a limited time.

Secondly:—The risk of a total or only of a partial loss, at which risk any capital may be invested, cannot be always the same; and it is obvious, that if the proportion of profit, contemplated in the association of Capital with Industry, should be sufficient for compensating that risk and for warranting its being incurred, the share of such profit, which in the shape of an annual rate of Interest is to devolve upon the Capital, ought in that case to be more considerable than the requisite share on a supposition that the Capital were subjected either to a less risk, or to no risk at all. But in a mathematical sense, the risk is not in any case to be considered as absolutely nul; although it may often be disregarded on the score of presumed exility. Therefore, any stipulated rate of Interest is implicitly compounded of two parts;—remuneration for the Capital employed, in proportion to the period of that employment,—and compensation for the risk: a distinction abundantly exemplified by the very different rates of Interest, at which the loans of British capital are granted, at home or to foreign countries.

Nevertheless, and discarding all consideration of the various degrees of risk attending the application to different purposes of borrowed Capital, Laws have been enacted, at almost all times, and nearly in all countries, for restraining the rate of Interest on loans of money.

Let us remark, that in the origin of what is called *Usury Laws*, the necessary protection of the absolute poor against tyrannical extortion, was the only view entertained. Very little reflection will then be necessary for discovering, that however well adapted those laws may have been to the state of society in former times, the case is widely altered; money having become as much a merchantable article as any other, and having an open market in every great city of Europe. In these days, such laws serve occasionally to obstruct mutual accommodation, upon terms justified on one hand by fair competition, and on the other hand by a due consideration of the greater or less risk that may attach to the intended application of any Capital; they are not less unjust than impolitic, inasmuch as they fail to operate according to the principle of reciprocity; they are in fact a direct infringement on the right of property, to free disposal, and to equal protection, of whatever description such property may be; they could not any longer be retained, except for the purpose of favouring particular classes of persons, to the disadvantage of other classes; and they should be considered as one amongst those remnants of barbarism, which we are always slow in eradicating.

Thirdly :—The effect of competition, in the money-market, is not only to establish the lowest possible rate of Interest, in those cases where the nature of the investment affords the utmost degree of security for the reimbursement of Capital borrowed; but also to introduce, between different modes of investment equally secure, another important distinction in the mutual relation of Capital and Interest. If the investment should be of such a description, that the Capital continued available at all times, and at a short notice,—every chance being retained of its more profitable or more eligible investment,—there exists in that case a sufficient inducement for preferring this mode of investment, even at a rate of Interest further reduced. But if any proposed investment, however substantially secure, should require the Capital to remain absolutely locked up during a considerable time,—precluding all favourable chances until the expiration of that time,—then the rate of Interest ought to be more elevated than in the preceding supposition. In a country abounding with floating capital, there are various motives in constant operation, tending to establish a remarkable difference between the ratios of Interest depending on this third circumstance. The position here advanced is corroborated by the comparatively low rate of Interest yielded by investments in the British Funded-Debt, which are accompanied with the convenience of commanding the Capital at any time, by means of re-selling in the public market the Stock of that debt, though at some contingent profit or loss, in consequence of the perpetual fluctuation in its price; and by the still lower rate of Interest afforded by investments in Exchequer Bills, the integral amount of which is equally available at all times, without incurring any such contingency. When the rate of Interest is remarkably low, the difference alluded to becomes more sensible; but if uncommonly high, the lender may on the contrary consider it an advantage to secure, during a long period, the employment of his Capital at that higher rate of Interest.

It follows from all this, that *Interest* and *Income*, though both relative to an investment of Capital, are not synonymous expressions; that the truly available Income, arising from any Capital laid out at Interest, is always in a less proportion than the rate of Interest stipulated for; and that, mathematically speaking, the present value of any sum of money, receivable at a future time, is not ascertainable by merely subtracting from it what is called *Discount*, considered as an equivalent for the Interest of Capital employed from the present to that future time, but by the further subtraction of another quantity, equal to that first residue multiplied by the fraction expressing the probability of failure in the expected receipt *.

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* All *mathematical probabilities* are represented by fractional quantities, expressing the exact proportions of those probabilities compared with *unity*, taken as the expression of *certitude*.

When any number of successive instalments of the Interest, according to a stipulated rate, or one implicitly understood, is not regularly paid to the Creditor; but by mutual consent is allowed to remain in the hands of the Debtor, who agrees that each instalment falling due shall be considered as a new loan, on the same terms at which the Capital of the original loan was granted to him; there arises, from this specific mode of transacting for Loans, what is termed *Compound Interest;* by which is implied, as a necessary consequence, the constant increase both of the Capital and of the Interest, in a geometrical progression, and for any length of time during which the same system may continue to operate.

From this last consideration is generated a series of combinations, the more susceptible of being complicated, as they involve in their generality many transactions of frequent recurrence, and in which the relation between Capital and Income is made to depend even upon uncertain events, such as the duration of human life, and therefore ascertainable only in the shape of their respective probabilities.

Annuities are to be discriminated, as either perpetual or terminable. A *Perpetual annuity* is the sum of money proportioned with the Capital of any loan, and covenanted for annual payment by the borrower to the lender, at certain intervals—usually of 12, 6, or 3 months from each other,—and in due proportion at each of those instalments, according to a stipulated rate of Interest, until the reimbursement of that Capital; but without any other limitation of time. A *Terminable annuity* differs from the preceding, inasmuch as its duration is limited either to a certain term of years, or by the occurrence of some anticipated event; when in either case the Annuity ceases, and the Capital of debt which it represented becomes cancelled.

Perpetual annuities that originate in loans to the British Government, and represent the Capital of those loans, are issued to the public at large, with the conveniences of being divisible at pleasure, and transferable with ease and without attendant expense; they are thus sold in the public market, under the general denomination of *Stock*, the price of which, always subject to fluctuation, is expressed by the sum given for *one hundred pounds* share of that Capital; but similar annuities resulting from contracts between individual persons are divested of those accompanying conveniences. Perpetual annuities issued by the Government may, by a special clause of contracts for loans, be constituted *irredeemable* during a certain term of years; by which is understood that the indebted party relinquishes, until the expiration of that term, (from whatever consideration it may be,) his natural right to discharge the capital of his debt; thereby assuring to the proprietors of Stock, of that description, the continuance of a rate of Interest considered as being advantageous for them. It is obvious, that the higher the constituted rate of Interest, the more valuable to the debtor is the privilege of redeeming his debt at pleasure.

Loans may be contracted for, and debts of other descriptions may be created, in such a shape as to supersede the obligation of refunding the capital at any time. This is when annuities are constituted payable, either during a specific term of years, during the natural life of any individual person, or during the longest amongst the lives of several nominated individuals. In the last two cases, the probable term of such life or lives,—which by certain rules is deducible from the respective ages of the nominees, combined perhaps with other considerations,— becomes one of the elements of calculation, instead of any period of time precisely determined; but in all cases of Terminable annuities, their ratio, or proportion with the Capital they represent, must be more elevated than the ratio of the corresponding Perpetual annuities, or simple rate of Interest, that should otherwise have been stipulated and payable until the reimbursement of the Capital.

From the nature and tendency of contracts for Terminable Annuities of any kind, it is immediately perceptible that the excess of their ratio, over and above the ratio of simple Interest, ought to be neither more nor less than a just equivalent for the Capital, considered as forthcoming when the corresponding Annuity attains its period of termination. If therefore we suppose *four per centum per annum* the rate of Interest stipulated for a loan; and that, independently of paying such Interest, the borrower annually set apart an additional *one per cent.* of the Capital, improving such surplus by the process of Compound Interest at the same rate of *four per cent.*, until the accumulation of a sufficient sum for discharging his debt,— this object would be attainable at the expiration of *forty-one* years, as will be seen in *page* 20th of the Tables here annexed. Whence follows, that an Annuity of *five pounds*, limited to *forty one* years duration, may be considered as the equivalent of another of *four pounds* only but payable *perpetually*, or otherwise until the reimbursement of *one hundred pounds* Capital represented by the latter Annuity. And it further follows, that the same purpose of-redemption may be accomplished by the Debtor, at the expiration of *forty-one* years, in consequence of his paying at the rate of *five per centum* annually to the creditor, during that limited period, as it would have been in case that he paid him in the proportion of *four per cent.* only, and undertook, by the personal management of the above mentioned surplus, to create the Capital ultimately required in that case for discharging his debt. If we should suppose any other rate of annual Interest than that of *four per cent.*, or any other proportion of annual surplus than that of *one per cent*, and applicable in the same manner, the results would not otherwise differ from the preceding, than as the surpluses in a greater proportion, or their improvement at a higher rate of Interest, would respectively contribute to abridge the period of redemption; and as that period would on the contrary be protracted, under the supposition of the rate of Interest being lower, or of the surplus being less.

Proceeding upon this general principle, of applying the savings from a periodical Income to the future redemption of Debt, the Governments of some indebted nations have instituted what is called *Sinking-funds;* consisting of annual sums set apart from the public revenue, or sometimes appropriated from merely fictitious resources,—and through the real or the simulated improvement of which, at Compound Interest, a reduction in the Capitals of such National debts is professed to be successively obtained. We have elsewhere enlarged on this important subject.

A Sinking-fund assumes the denomination of *Redemption-fund,* when the savings of Capital, of Income, or of both, and destined for improvement at Compound Interest, with the intention to redeem at the expiration of a stated period any specific Capital of Debt, are with sufficient exactness proportioned with that object; so as to insure its attainment according to all moral probability.

Transactions between individual persons are liable also to be framed, in a variety of shapes, upon the same principle. When they relate either to the mere improvement of Capital at Compound Interest, to the purchase or to the grant of Annuities for specific terms of years certain, or to the accumulation of savings out of a certain income for creating any determinate capital at the end of a given time, the solution of the questions concerning those transactions depends on the possession of any *three* amongst the following *five* data: *first,* the period of time; *secondly,* the rate of Interest; *thirdly,* the present or the future Capital; *fourthly,* the quantity of the terminable Annuity; *fifthly,* its cumulated amount at the expiration of the period referred to. All other quantities involved in the question are then capable of being deduced, with more or less facility, and by known rules of calculation, from those three data only. But the transactions that involve the further consideration of uncertainty, as to the duration of lives, are to be viewed under a different aspect. They possess a peculiar character; and the solution of questions concerning Life-assurances and Life-annuities, reversions of Capital and reversionary annuities, survivorships, endowments, or other analogous transactions, requires the additional introduction of specific data.

We have already made the remark, in a preceding publication, that the collective results of a multitude of transactions relative to life interests, embraced by Governments or by incorporated societies, exhibit only inconsiderable variations from what had been previously ascertained as the result of calculation upon satisfactory data; but that the case is widely different, when solitary transactions of this description are ventured between one individual and another, or even when the quantity of assimilated transactions is too small for affording sufficient probability that the average results shall in a certain degree approximate the mathematical anticipations; and therefore, that such solitary transactions not only constitute a species of gaming, but scarcely retain the character of equitable contracts, particularly when it is considered that an accurate ascertainment of the respective values of Expectancies, duly discriminated, is often unattainable for the contracting parties.

Besides, the speculations upon life and death, between private individuals, are attended with great moral inconvenience. This entirely disappears in the multifarious transactions of societies, whose principal object is to secure, by a wholesome administration of their affairs, certain average and equitable results.

Nor should the profits derived to those societies, if moderate, be considered as a disadvantage for the individuals contracting with them. In human concerns, individually considered, there is always a moral and appreciable disadvantage attending *uncertainty*. The real value of property, if the whole be exposed to any single risk, is by no means equal to the integral amount of that property, ***minus*** the mathematical proportion at which the risk incurred might be accurately ascertained; and there may possibly exist a great difference between the value of the *Mathematical Expectation* and the value of the *Moral Expectation*, both deduced from the probability of the result. The relative difference will be the more considerable, and therefore the value of the latter Expectation—which is chiefly to be considered—will be less, in proportion as the risk is presumed to be small; as for instance the ordinary risk of *Fire*. But admitting, instead of a single risk incurred by the whole undivided property, a division of that property into portions exposed to separate risks although of similar kind, the relative difference between the two values will then be reduced; and it would ultimately vanish altogether, if an infinite division of risks could be calculated upon. Whence follows, that the values of those two Expectations very nearly coincide, in respect to the societies alluded to; and that each individual assured by them, under just regulations, gains in reality, by the mere exchange of his uncertainty against a determinate and convenient object of certitude.

THE

DOCTRINE

OF

COMPOUND INTEREST.

Part First;

CONTAINING THE APPLICATION OF THAT DOCTRINE TO PERPETUAL ANNUITIES, AND TO TERMINABLE ANNUITIES THE PERIOD OF WHICH IS UNCONDITIONAL.

THE doctrine of COMPOUND INTEREST chiefly consists in the developement of a very few mathematical principles.

(I.) FIVE quantities are here to be considered, as bearing an invariable relation with each other, under all their possible combinations; and when describing those quantities in a general point of view, we shall affix to each a conventional sign, or initial representative, for the purpose of future reference, as also for that of facilitating certain expressions in an algebraic form, and immediately pointing out the arithmetic operations required for numerically solving the various questions susceptible of arising on this subject, when the indispensable data are afforded.

First:—Let p signify the *Principal;* implying either any present capital destined for improvement at compound interest,—the present value to which is reducible any other capital more considerable, and forthcoming at a future period,—or else the equivalent for any annuity payable at certain instalments computed from the present time, and until a stated period when such annuity is to terminate.

Secondly:—Let a signify that *Annuity*, or one of the equal sums successively forthcoming at the expiration of equidistant periods, whether consisting of one year, of six months, of three months, or of any other interval of time commencing from the present.

Thirdly:—Let n signify the quantity of those forthcoming sums, each of which equal to a.

Fourthly:—Let r signify the *Ratio*, or the fraction expressing a standard proportion of interest, produced by every *unit* comprised in whatever invested capital, and for any one of those periods the quantity of which is expressed by n.

Fifth and lastly:—Let m signify either the *Improved Principal*, originally p and invested at compound interest in the ratio r, during the time implied by n,—any capital forthcoming at a future period, and which by discount under the consideration of compound interest would be reducible to p as the present value of that capital,—or the cumulated amount of the successive sums a, added together, with their respective improvements at compound interest according to the ratio r from each instalment to the next, and until the period of termination of the annuity by the receipt of the last of those sums.

(II.) It follows from those definitions, that by the operation of Compound Interest during any period n, the improvement of every *unit* comprised in the principal p must, at the respective stages of such period, accord with the successive terms of this geometrical progression . . . .

$$\div\!\!\div\ (1+r)^1 : (1+r)^2 : (1+r)^3 : (1+r)^4 : \&c. \ldots\ldots\ldots \text{ to } (1+r)^n; \quad . \ . \ .$$

and therefore that the present value, by discount of every *unit* comprised in any sum forthcoming at those different stages respectively, must also accord with the successive terms of this other progression . . . .

$$\div\!\!\div\ \frac{1}{(1+r)^1} : \frac{1}{(1+r)^2} : \frac{1}{(1+r)^3} : \frac{1}{(1+r)^4} : \&c. \ldots\ldots\ldots \text{ to } \frac{1}{(1+r)^n}.$$

(III.) Having thus observed that *unity*, considered as the *principal*, will, at Compound Interest in the ratio r and at the expiration of a period n, improve into a quantity $(1+r)^n$, any ascertained principal, or present capital expressed by p, will consequently improve into $p(1+r)^n$; whence, and expressing by m this improved principal, if any three of the four quantities, n, r, p, and m, be known, the fourth will be ascertainable by resolving into a numerical expression some one amongst the following four, which are mere transformations of the above original equation, identical with each.

Questions:

m (the improved principal) $= p(1+r)^n$.

p (the original principal, or present capital) $= \dfrac{m}{(1+r)^n}$.

r (the ratio of interest, corresponding with each interval of time) $= \left[\dfrac{m}{p}\right]^{\frac{1}{n}} - 1$;

or $\log.(1+r) = \dfrac{\log. m - \log. p}{n}$.

n (the quantity of successive instalments) $= \dfrac{\log. m - \log. p}{\log.(1+r)}$.

It may be expedient to illustrate these positions by appropriate examples.

(IV.) Suppose the principal p to be £12500, 3½ *per cent.* the nominal rate of annual interest at which that present capital may be improved by half-yearly instalments, the ratio r in that case $= 0\cdot0175$; and that a term of 25 years were prescribed for the improvement, n being consequently equal to 50 half-yearly instalments of the interest. We have the improved principal $m = p\,(1+r)^n = 12500 \times (1\cdot0175)^{50}$; and reducing this to a logarithmic expression, $\log. m = \log. 12500 + 50\,(\log. 1\cdot0175) = 4\cdot0969100 + 50\,(0\cdot0075344179) = 4\cdot4736309$. This last logarithm corresponds with £29760, the sum into which such principal p is improvable at the expiration of 25 years.

(V.) Suppose m a sum of £40000 required at the expiration of 20 years, and to be obtained by the improvement at Compound Interest of a present capital p, invested at an interest of 4 *per cent. per annum*, accruing by quarterly instalments; in which case $r = 0\cdot01$, and $n = 80$. That capital to be invested, or the discounted value of the future capital m, being $p = \frac{m}{(1+r)^n} = \frac{40000}{(1\cdot01)^{80}}$, will be ascertained by an operation analogous to the above; and we have $\log. p = \log. 40000 - 80(\log. 1\cdot01) = 4\cdot6020600 - 80(0\cdot0043213738) = 4\cdot2563501$, which last quantity is the logarithm of £18045, the capital to be invested.

(VI.) Suppose a principal of £10000, intended for improvement at Compound Interest during 37½ years, so as to produce at the expiration of that period a capital of £40000; and the question, in that case, what the rate of annual interest should be, under the stipulation of half-yearly instalments. The data being $p = 10000$, $m = 40000$, and $n = 75$ (half-years), we have $\log. (1+r)$

$$= \frac{\log. m - \log. p}{n} = \frac{\log. 40000 - \log. 10000}{75} = \frac{4\cdot6020600 - 4}{75} = 0\cdot0080274666;$$

this last logarithm corresponds with $1\cdot018656 = 1+r$; whence $r = 0\cdot018656$ is the ratio of half-yearly interest, the nominal rate of which *per annum* is therefore $0\cdot037312$, or a very small fraction less than 3¾ *per centum*.

(VII.) Suppose £25000 invested at an interest of 4½ *per centum per annum*, payable quarterly, with a view to accumulate in process of time, and by the operation of Compound Interest from each quarter of a year to the succeeding quarter, a capital of £125000 ultimately required; and be it asked the period n, computed from the present time, and at the expiration of which the desired improvement will be accomplished. In this case, we have $p = 25000$, $m = 125000$, and $r = \frac{0\cdot045}{4} = 0\cdot01125$; . . . .

whence $n = \frac{\log. m - \log. p}{\log. (1+r)} = \frac{5\cdot0969100 - 4\cdot3979400}{0\cdot00485853} = 143\cdot864$, being very nearly 144 quarters, or 36 years, the requisite term.

(VIII.) Questions analogous to either of the preeding four may be put in various shapes; but the similitude of cases,—as it chiefly rests upon the possession of any three data amongst the general quantities m, p, r, and n,—can scarcely fail to be easily discernible.

(IX.) But in order to establish, invariably, the relation between each of the *five* general quantities susceptible of being considered in questions of this kind, and the other four of those quantities, let us now substitute, for *unity*, any quantity a of periodical income terminating at the expiration of a time expressed by n; such quantity a to be compared with the Principal p, and necessarily discriminated from the ratio r or standard rate of interest. It clearly follows again, that p can be no other than the addition of the respectively discounted quantities a, understood as the sum forthcoming at each stage of that period n. Those discounted quantities will then accord with the successive terms of the progression . . .

$$\div\!\div \frac{a}{(1+r)^1} : \frac{a}{(1+r)^2} : \frac{a}{(1+r)^3} : \frac{a}{(1+r)^4} : \&c. \ldots \text{to } \frac{a}{(1+r)^n}; \quad \ldots$$

the united value of which . . . .

$$p = \frac{a}{(1+r)^1} + \frac{a}{(1+r)^2} + \frac{a}{(1+r)^3} + \frac{a}{(1+r)^4} + \&c. \ldots \text{to} + \frac{a}{(1+r)^n}$$

$$= \frac{a - \dfrac{a}{(1+r)^n}}{r} = \frac{a\,(1+r)^n - a}{r\,(1+r)^n},$$ (by the general rule for summing the terms of any geometrical progression) is the *Present value of the Terminable annuity.*

(X.) The quantity a, in its relation with p (the *Principal*), has hitherto been considered as an Annuity, or as the portion of an annuity terminating at a period n that indicates the precise quantity of forthcoming instalments of such terminable annuity. But admitting, in compliance with general custom, the fiction of *Perpetuity;* by which is understood that the annuity shall continue, either without end, or until the redemption of the capital it originally represented; the last term $\frac{a}{(1+r)^n}$ of the preceding progression, and consisting of a then divided by an infinite quantity, becomes null, as it is no other than the discounted value of a, a quantity infinitely remote and in fact never forthcoming at all. Hence the addition of the successive terms of the above progression, thus modified, will instead of $p = \dfrac{a - \dfrac{a}{(1+r)^n}}{r}$ be $p = \dfrac{a}{r}$; expressing the *Present value of the Perpetual annuity.*

Under this hypothesis, in which the quantity n is discarded from consideration, if p, a, and r, be successively admitted as the *unknown* quantities, they are readily ascertainable by resolving into numerical expressions the three algebraic expressions (now extremely simplified,) $p = \frac{a}{r}$, $a = pr$, and $r = \frac{a}{p}$; the last two of which are mere transformations of the first.

It is self-evident that, under this same hypothesis, the quantity m, considered as questionable so long as n could be retained as a limited quantity, must now be discarded also; because any sum, whether p or a, and however small, necessarily becomes *infinite*,—that is to say, greater than any assignable quantity,—when proceeding from its uninterrupted improvement during eternity; and therefore no question can possible arise in the present case, as to any ascertainable quantity m.

(XI.) Examples of the three questions relative to Perpetual Annuities.

First:—Let £5000 be the principal p, or the value of an annuity payable by quarterly instalments, the first of which falling due in three months from the present time; and let the nominal rate of annual interest be 5 *per centum*, or in the ratio $r = 0{\cdot}0125$ for one quarter. Each of those quarterly instalments will then be $a = pr =$ £$5000 \times 0{\cdot}0125 =$ £62. 10*s.*; four times which, or £250, will be the Annuity. The multiplication, at once, of £5000 by 0·05 or by the rate, *per annum*, yields the same result.

Secondly:—Let the principal be £5000, and the Annuity nominally £275, but in reality £137. 10*s.* half-yearly; then the ratio $r = \frac{a}{p} = \frac{137{\cdot}5}{5000} = 0{\cdot}0275$, corresponding with each half-yearly instalment; and 0·055, otherwise 5½ *per cent.*, will be the nominal rate of Interest *per annum*, according to which such annuity is paid. The same result is obtained by merely dividing 275 by 5000.

Thirdly:—Let the annuity be nominally £300, but accruing by quarterly payments of £75 each; and suppose 4½ *per cent. per ann.* the nominal rate of Interest by which the calculation is to be governed, which reduces the quarterly ratio r to 0·01125; the present value of a perpetual annuity, to the above amount, will then be $p = \frac{a}{r} = \frac{75}{0{\cdot}01125} =$ £6666.13*s.*4*d.* And if the whole annual sum of £300 be divided by 0·045 or the rate of annual interest, the same quantity £6666. 13*s.* 4*d.* will exhibit the capital represented by that Annuity.

(XII.) Should the first instalment of an annuity, whether terminable or perpetual, be paid at the outset of the constituting transaction, instead of being payable at the expiration only of the first year, the first half-year, the first quarter, or at the expiration of any other specific term, computed from the period ot investment of the corresponding principal p; such anticipated payment, of any sum a, ought in that case to be considered in no other light than as a reduction of the invested principal itself. This is indeed the simplest and clearest view to be taken of the matter; whence the relations between the several quantities a, r, n, and p, need not be established by any other rules than those already set forth; requiring only to substitute $p-a$, for the *principal*, instead of p, and to prosecute the calculations accordingly.

(XIII.) If any future capital m is to result from the accumulation of each portion a of income, improved at Compound Interest until the expiration of a period n, that quantity m can be no other than the addition of the several quantities a, respectively improved until that term of expiration. And if it be further considered, that the first portion a will be forthcoming only at the end of one of the stipulated intervals computed from the present time, and each of which produces interest in the ratio r; such portion of income consequently benefitting no more than by a quantity $n-1$ of successive stages of improvement, whilst the last portion a, forthcoming at the complete expiration of the period n, is not susceptible of any improvement at all; we shall have by analogy with the progression (IX) . . . .

$$m = a + a(1+r)^1 + a(1+r)^2 + a(1+r)^3 + a(1+r)^4 + \&c. \ldots \text{to} + a(1+r)^{n-1},$$

which by the rule of summation resolves into . . . .

$$m = \frac{a(1+r)^{n-1} \,.\, (1+r) - a}{r} = \frac{a(1+r)^n - a}{r}\text{; and this quantity is the}$$

Cumulated annuity, or what the authors have technically termed the *Amount* of the annuity.

It is immediately perceptible that the quantities p and m, the former of which has been analized in *section* IXth, stand in such mutual relation as constantly to produce $\frac{m}{p} = (1+r)^n$.

(XIV.) But independently of m, we may admit another quantity M, similarly formed of the same quantity n of consecutive and equal portions a of income, the first of which realized at the moment of the supposed investment of the principal p, all the other portions forthcoming at equidistant intervals, and the whole respectively improved during n stages; in such manner, that the last realized of those sums a participated, during one of those stages or intervals of time, in the general process of improvement embracing a whole period equal to that already considered in forming the quantity m. It is obvious that, in such case, M will exceed the latter by a single quantity $a(1+r)^n$, resulting from the improvement at Compound Interest of one of those sums a realized at the outset; that quantity $a(1+r)^n$ diminished however by another quantity a that will not, as in the former case, be forthcoming at the close of the period indicated by n. That is to say, that M and m are so related as invariably to produce $M = m + a(1+r)^n - a$: the two cases differing from each other, in consequence only of the first instalment of the periodical income a being, in one case, exclusively realized at the outset of the transaction, whilst an equal quantity is, in the other case, exclusively realized at the terminating period of the operation of improvement.

Having thus inferred, from a simple mode of reasoning, the equation . . $M = \frac{a(1+r)^n - a}{r} + a(1+r)^n - a = \frac{a(1+r)^n - a + ar(1+r)^n - ar}{r}$, there now remains to establish this position by direct calculation analogous to those that have produced the equations p and m (IX and XIII.)

From the definition, this quantity M is equal to the successive terms of the following progression added together:—

$\div\, a(1+r)^1 : a(1+r)^2 : a(1+r)^3 : a(1+r)^4 :$ &c. . . . . to $a(1+r)^n$ inclusive; the summation of which, by the general rule, produces $M = \frac{a(1+r)^{n+1} - a(1+r)}{r}$, identical with the preceding equation.

Should this identity not appear at a first glance, it will be sufficient to observe, that dividing by $\frac{a}{r}$ each of those assimilated results, they become . . . .

$(1+r)^n + r(1+r)^n - (1+r) = (1+r)^{n+1} - (1+r)$, ...

whence $(1+r)^n + r(1+r)^n = (1+r)^{n+1}$; . . . .

and again dividing them by $(1+r)^n$, the identical results $(1+r)$ are obtained.

(XV.) Being now possessed of two fundamental equations, establishing the respective values of any present capital p, and of any future capital m, in their relation together and with the other quantities a, r, and n; we are enabled, through the transformations of which those equations are susceptible, and provided that any *three* of those *five* quantities are supplied as the data, to ascertain the remaining *two*.

Any *five* objects afford *ten* combinations, by which *two* of those objects may be separated from the *three* others; hence there are also ten different modes, according to which the questions may possibly be framed; the unknown quantities being either p and a, p and r, p and n, p and m, a and r, a and n, a and m, r and n, r and m, or n and m.

Waiving, as unnecessary towards practical purposes, the mathematical demonstrations that would point out the path leading to our conclusions, it may immediately be proceeded to exhibit the various theorems solving, in each of those ten cases, the respective questions of the two unknown quantities.

CASES.	DATA.	SOLUTION OF THE *FIRST* UNKNOWN QUANTITY.	SOLUTION OF THE *SECOND* UNKNOWN QUANTITY.
I.	$n, p, r.$	$a = \frac{pr(1+r)^n}{(1+r)^n-1}.$	$m = p(1+r)^n.$
II.	$m, n, r.$	$a = \frac{mr}{(1+r)^n-1)}.$	$p = \frac{m}{(1+r)^n}.$
III.	$a, n, r.$	$m = \frac{a[(1+r)^n-1]}{r}.$	$p = \frac{a[(1+r)^n-1]}{r(1+r)^n}.$
IV.	$m, p, r.$	$n = \frac{\log. m - \log. p}{\log. (1+r)}.$	$a = \frac{mr}{(\frac{m}{p}-1)} = \frac{mr}{(1+r)^n-1)}.$
V.	$a, p, r.$	$m = \frac{ap}{a-pr}.$	$n = \frac{\log. a - \log. (a-pr)}{\log. (1+r)}.$
VI.	$a, m, r.$	$p = \frac{am}{a+mr}.$	$n = \frac{\log. (a+mr) - \log. a}{\log. (1+r)}.$
VII.	$a, m, p.$	$r = \frac{a}{m}\left(\frac{m}{p}-1\right).$	$n = \frac{\log. m - \log. p}{\log. (1+r)}.$
VIII.	$m, n, p.$	$r = \left(\frac{m}{p}\right)^{\frac{1}{n}}-1.$	$a = \frac{mr}{(1+r)^n-1}.$
IX.	$a, n, p.$	$\left.\begin{array}{l} b = \frac{6}{n-1} \\ d = \left(\frac{an}{p}\right)^{\frac{2}{n+1}} \\ f = b-2(d-1) \end{array}\right\\} r = b-\surd(bf) = \frac{a}{m}\left(\frac{m}{p}-1\right).$	$m = p(b+1-\surd bf)^n = \frac{ap}{(a-pr)}.$
X.	$a, m, n.$	$\left.\begin{array}{l} c = \frac{6}{n+1} \\ e = \left(\frac{m}{an}\right)^{\frac{2}{n-1}} \\ g = 2(e-1)+c \end{array}\right\\} r = \surd(cg)-c = \frac{a}{m}\left(\frac{m}{p}-1\right).$	$p = \frac{m}{[\surd(cg)+1-c]^n} = \frac{m}{(1+r)^n}.$

In the first *six* cases of the preceding cathegory, and in which the quantity r or ratio of interest is one of the data supplied, the equations that point out the respective solutions of the unknown quantities are obtained through very simple transformations of the equations already established (IX and XIII); and each of the two questions concerning those unknown quantities may be solved independently of the other. But the last *four* cases, where r is one of the unknown quantities, involve these peculiarities; that in the 7th and 8th, r must be solved before the other unknown quantity can be ascertained,—and that in the 9th and 10th cases, the unknown quantities are not strictly commensurable, each admitting only an approximate solution in consequence of the elevated degree n of the indicative equations.

It may not be easily perceived, in those last two cases, how the conclusions are arrived at; which, in the *ninth* case, is as follows.

From $p = \frac{a(1+r)^n - a}{r(1+r)^n}$ is immediately deduced $\frac{1}{p} = \frac{r(1+r)^n}{a(1+r)^n - a}$, . . .

whence $\frac{an}{p} = \frac{nr(1+r)^n}{(1+r)^n - 1}$; and developing the series, according to the Binomial theorem, we have . . . .

$$\frac{an}{p} = \frac{1+nr+n\frac{(n-1)}{2}r^2+n\frac{(n-1).(n-2)}{2\times 3}r^3+\&c.}{1+\frac{(n-1)}{2}r+\frac{(n-1).(n-2)}{2\times 3}r^2+\frac{(n-1).(n-2).(n-3)}{2\times 3\times 4}r^3+\&c.}$$

$$= 1+\frac{n+1}{2}r+\frac{(n+1).(n-1)}{2\times 2\times 3}r^2-\frac{(n+1).(n-1)}{2\times 3\times 4}r^3+\&c.$$

But it is observable, by means of a similar developement, that . . . . .

$$(1+r)^{\frac{n+1}{2}} = 1+\frac{n+1}{2}r+\frac{(n+1).(n-1)}{2\times 2\times 2}r^2+\frac{(n+1).(n-1).(n-3)}{2\times 2\times 2\times 2\times 3}r^3+\&c.,$$

the first two terms of which are identical with those of the preceding series; and therefore, if we further admit $\frac{an}{p} = (1+r+z)^{\frac{n+1}{2}}$, ...

there will be $(1+r+z)^{\frac{n+1}{2}} = 1+\frac{n+1}{2}r+\frac{n+1}{2}z+\frac{(n+1).(n-1)}{2\times 2\times 2}r^2+\&c.$;

which compared with the above first series produces . . . .

$$\frac{n+1}{2}z+\frac{(n+1).(n-1)}{2\times 2\times 2}r^2=\frac{(n+1).(n-1)}{2\times 2\times 3}r^2;\text{ whence } z = -\frac{n-1}{12}r^2.$$

Consequently, $\left(1+r-\frac{(n-1)r^2}{12}\right)^{\frac{n+1}{2}}=\frac{an}{p}$, or otherwise . . . .

$1+r-\frac{n-1}{12}r^2=\left(\frac{an}{p}\right)^{\frac{2}{n+1}}=d$, or again $r^2-\frac{12r}{n-1}=\frac{12}{n-1}(1-d)$; from which, and as the first four terms in the developement of $\left(1+r-\frac{n-1}{12}r^2\right)^{\frac{n+1}{2}}$ are identical with those arising from the developement of the first series above, is ultimately deduced $r=\frac{6}{n-1}-\sqrt{\left(\frac{6}{n-1}\right)\times\left[\frac{6}{n-1}-2(d-1)\right]}=b-\sqrt{(bf)}$.

An analogous process leads to the conclusions in the *tenth* case.

(XVI.) The practical questions most frequently recurring are those in which r, or the ratio of interest, and n or the quantity of instalments forthcoming of such interest, or of any annuity until its terminating period, are known quantities; those unknown and questionable, under that supposition, being limited to p, m, and a. Admitting then the third datum to be p, there may be two questions, the one concerning m, and the other concerning a; admitting the third datum m, the questions may in the same manner concern either a or p; and admitting a as the third datum, jointly with r and n, the questions susceptible of arising may be concerning p or concerning m. All those questions apply to the first *three* only, of the *ten* cases exhibited in the preceding section, where their respective solutions are given.

Those *six* questions are selected as the proper subject of general TABLES, applicable to daily use; and in order to facilitate their construction, in such manner as to avoid either confusion or obscurity, it has been necessary to substitute *unity* for the third quantity supposed to be known. The solution of each question, thus referable to every unit contained in that known quantity—whether p, m, or a,—is susceptible of being expressed by a numerical quantity referable also to every joint indication of those represented by r and by n.

(XVII.) From this description of the *Tables*, their insufficiency towards the solution of questions in many other cases should not however be inferred. Whenever one at least, of the two quantities r and n, forms part of the data supplied, those tables will afford an easy method of solving, with sufficient approximation towards all practical purposes, the question relative to the other quantity, whether r or n, and supposed to be the unknown. The various positions here implied shall, in due progress, be illustrated by appropriate examples. Amongst the ten cases aforementioned, the *seventh*, in which r and n are both unknown quantities, exhibits in that respect a solitary instance, in which the method of direct calculation must inevitably be resorted to, according to the equations pointed out in page 40th, for numerically solving the two questions then susceptible of arising.

The six questions comprised in the first, the second, and the third cases, and of which the solution in numerical quantities is obtained by the *Tables*, are as follows:

(XVIII.) **First Question.**—Being given the ratio r, either of annual, of half-yearly, or of quarterly interest; as also the quantity n of those instalments, intervening until a final period when such interest is to cease; and substituting *unity* for the principal p, or for any present capital supposed to be invested; $m = p(1+r)^n$ is then reducible to the more simple expression $m = (1+r)^n$, indicating the *Improved principal*, or the quantity to which every unit comprised in the original principal will amount, by its improvement at compound interest, at the expiration of the stated period.

Example.—Suppose $3\frac{1}{2}$ *per cent. per ann.* the nominal* rate of interest, at which a present capital of £16500 may be improved half-yearly and during a period of 36 years; whence $r = 0{\cdot}0175$ is the half-yearly ratio, and $n = 72$ is the quantity of successive instalments for the accretion of interest. We have $m = (1+r)^n = (1{\cdot}0175)^{72} = 3{\cdot}4872098$; which, as appears in *page* 12th of the tables, is the improvement of every unit contained in the principal £16500; and therefore, multiplying the latter into the preceding quantity, we find £57538·96, or very nearly £57539†, to be the improvement of that principal at the expiration of 36 years.

(XIX.) **Second Question.**—Being given the ratio r of interest at which any principal may be invested, and also the quantity n of instalments of a terminable annuity proposed as the equivalent for that principal, or present capital; if *unity* be substituted for such principal, the equation . . . .

$$a = \frac{pr(1+r)^n}{(1+r)-1^n} \text{ will in that case become simplified into } a = \frac{r(1+r)^n}{(1+r)^n-1},$$

indicating the *Ratio of the annuity*, or a fraction comparable with unity, and expressing the proportion which the annuity, intended to terminate with the period n, should bear with that capital, or with the price for which the said annuity is to be purchased.

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* This rate is here called *nominal*, in contradistinction with that of $1\frac{3}{4}$ *per cent.*, the proportionate and true rate of interest accruing every half-year, and added to the principal at each stage of its improvement.

† The reader is always supposed to possess a clear notion of decimal arithmetic, without which we could not possibly make ourselves understood.

Example.—Suppose 3¾ *per cent. per ann.* to be the rate at which money might be laid out at interest, with the condition of its accruing by half-yearly instalments; and that a capital of £25000 were proposed for the purchase of an annuity limited to 13½ years' duration, and payable also by half-yearly instalments, the last of which falling due at the expiration of that term. In the present case we have $r = 0{\cdot}01875$, and $n = 27$; whence $a = \frac{r(1+r)^n}{(1+r)^n - 1}$ $= \frac{(1{\cdot}01875)^{27} \times 0{\cdot}01875}{(1{\cdot}01875)^{27} - 1} = \frac{(1{\cdot}6512993)^{27} \times 0{\cdot}01875}{0{\cdot}6512993} = 0{\cdot}0475386$, which is the half-yearly ratio, and therefore 0·0950772 the whole ratio according to which the annuity should be paid as an equivalent. By referring to the table (*page* 15th), this result of calculation will immediately be found; and as it expresses the annuity corresponding with *one pound* supposed principal, it follows that $0{\cdot}0950772 \times 25000 = 2376{\cdot}93$, or say £2377, should be the annual sum paid during thirteen years and one half.

In all questions of this description, it is invariably to be understood (without which the conclusion must be false) that the instalments of the proposed annuity must, in due proportion, take place at the same intervals as would otherwise be stipulated for the corresponding rate of perpetual interest. Various cases, in which a deviation from uniform principles is admissible, are generally—and in order to avoid confusion—reserved for consideration hereafter.

(XX.) Third Question.—Any capital m is forthcoming at a future period, the interval to which, computed from the present time, being divided into n equidistant instalments, whether annual, half-yearly, quarterly, or any other, each of them is productive of interest in the ratio r; query the present value p of such future capital, reduced by the adequate discount in which the operation of Compound interest is considered. The solution of this question has already been given under the general expression $p = \frac{m}{(1+r)^n}$; but if *unity* be substituted for m, that expression becomes $p = \frac{1}{(1+r)^n}$, indicating the *Discounted Value* of every unit comprised in the capital forthcoming at the stated period.

Example.—A sum of £6425 : 10s. is forthcoming at the expiration of 7½ years; the rate of annual interest at which the investment of capital might now be made is 4 *per cent.*, accruing however by quarterly instalments of *one per cent.* each; and it is inquired the present value of that future sum, discounted in regard to the lapse of 30 quarters of years. The value of every unit contained in such future capital is $p = \frac{1}{(1+r)^n} = \frac{1}{(1{\cdot}01)^{30}} = \frac{1}{1{\cdot}3478489} = 0{\cdot}7419229$, as will be seen in the Table (*page* 19th); therefore the total present value is . . . . $6425{\cdot}5 \times 0{\cdot}7419229 = 4767{\cdot}225$, or £4767. 4*s*. 6*d*.

(XXI.) Fourth Question.—Having ascertained the ratio r, of interest accruing either by annual, by half-yearly, or by quarterly instalments, and according to which ratio it is admitted that money may be uninterruptedly improved at compound interest during a period of certain extent or a quantity n of such instalments; and supposing that any capital m, required at the expiration of that period, were then to result from the accumulation of that same quantity n of equal sums a, successively forthcoming or periodically saved, and in both cases improved during the specified period, from each instalment to the next; the equation $a = \frac{mr}{(1+r)^n - 1}$ will, in case of substituting *unity* for m or the future capital required, be simplified into $a = \frac{r}{(1+r)^n - 1}$, indicating the proportion which such periodical *Redemption-fund* should bear with that future capital; or in other words, $\frac{r}{(1+r)^n - 1}$ is the fractional expression of the annuity, or of the portion of annuity corresponding with each interval between the successive instalments, and required to be laid out for accumulation, so as ultimately to produce *unity* at the time when the capital m will be wanted.

Example.—A sum of £125000 will, at the end of 41 years from the present time, be required for redeeming a debt to that amount, and then only demandable; and it is inquired the adequate annuity accruing by quarterly instalments,—the first of which becoming due in three months from the present time,—or otherwise the adequate savings to be made at similar periods out of any income, for the purpose of accumulation and improvement at Compound Interest, towards the intended redemption, and admitted to be practicable throughout that period of 41 years, or 164 quarters, at the nominal rate of $4\frac{1}{4}$ *per cent. per annum*, but really in the quarterly and proportionate ratio 0·010625. We have in that case

$$a = \frac{r}{(1+r)^n - 1} = \frac{0{\cdot}010625}{(1{\cdot}010625)^{164} - 1} = \frac{0{\cdot}010625}{4{\cdot}6593442} = 0{\cdot}002280364, \text{ the}$$

quarterly prorata, and therefore 0·0091215 the prorata of annual savings required, as will also be seen in the Table (*page* 25th); and which quantity multiplied into £125000 produces 1140·182, or very nearly £1140. 2*s.* as the annual redemption-fund to be appropriated.

This fourth question is stated in terms that perhaps may appear unnecessarily minute; but it is sometimes assumed on insufficient grounds, that a certain rate of Interest, available for the time being, will thus continue during a very protracted period; in consequence of which miscalculation, important errors are not unlikely to result. When under peculiar and transitory circumstances, the rate of interest happens to be unusually high, or else unusually low, it is indispensably necessary, for calculating any anticipated improvement of Capital at Compound Interest for a great length of time, to adopt such moderated rates of Interest as may safely be relied on; and this calls for the exercise of great sagacity, as the error may lie on either side of the argument.

(XXII.) Fifth Question.—Any quantity n, of equal sums a, is forthcoming at equidistant intervals of time computed from the present; the ratio r of Interest is ascertained with reference to one of those intervals, whether consisting of years, half-years, quarters of years, or any other; and it is inquired the present equivalent p of those forthcoming sums, considered in the aggregate and relatively to the operation of Compound Interest. This question, of the *Value of an annuity*, is the counterpart of the 2d, in the same manner as the third question is the counterpart of the first. If *unity* be then substituted for a, or for one of those equal sums, the equation $p = \frac{a[(1+r)^n-1]}{r(1+r)^n}$ becomes $p = \frac{(1+r)^n-1}{r(1+r)^n}$; thus expressing the equivalent, in present capital, that should be given for every unit contained in the quantity a of periodical income; or otherwise indicating what is usually called the number of *years' purchase* of an annuity, when a being any other than one whole year's income, a due proportion relative to the latter is substituted instead of it.

Example.—Suppose an annuity of £750, forthcoming in one single payment at the expiration of the year now commencing and of every succeeding year to the 35th inclusive; and the rate of interest, at 4½ *per centum per annum*, assumed to be available during the whole of that period; it is required the number of years' purchase that should be paid as the equivalent for that annuity.

$$\text{We have } p = \frac{(1+r)^n-1}{r(1+r)^n} = \frac{(1\cdot045)^{35}-1}{(1\cdot045)^{35}\times 0\cdot045} = \frac{3\cdot6673478}{4\cdot6673478\times 0\cdot045} =$$

$= 17\cdot461$, or very nearly 17½ years' purchase; and this *value of the annuity* is accordingly found in the Table (*page* 28th.)

Other Example.—Suppose an annuity of £1200, payable by quarterly instalments during 45 years, the first quarter now commencing to run; and the rate of interest, admitted to govern the calculation, being 4¾ *per cent. per annum*, but subject also to quarterly payments; query the present value of that annuity? In this case we have the quarterly ratio $r = 0{\cdot}011875$, and the quantity of forthcoming instalments $n = 180$; whence . . . .

$$p = \frac{(1{\cdot}011875)^{180} - 1}{(1{\cdot}011875)^{180} \times 0{\cdot}011875} = \frac{7{\cdot}3721287}{8{\cdot}3721287 \times 0{\cdot}011875} = 74{\cdot}15209.$$

As the latter quantity multiplied into the true and *quarterly* income would constitute the required equivalent, it follows that 18·53802 is the quantity of times the nominal and *annual* income, or in other words the number of years' purchase; and the same result is exhibited in *page* 32d of the Tables.

(XXIII.) Sixth Question.—The quantities r and n are given, as in the 4th question of which this is the counterpart; and a is a sum applied, at each of the successive and equidistant instalments (in quantity n), to create a capital at the expiration of the whole term:—Query, what will be the amount of that capital?

Substituting *unity* for a, or for the sum thus appropriated at each instalment, the equation $m = \frac{a[(1+r)]^n - 1]}{r}$ will become $m = \frac{(1+r)^n - 1}{r}$; indicating the future capital which every unit contained in the quantity a of periodical savings will create, or in other words the *Cumulated annuity*.

Example.—The rate of Interest, subject to half-yearly payments, is 5 *per cent. per annum*, and it is assumed that it will thus continue available during an indefinite period; a sum of £350 is each year, and in the proportion of £175 at the expiration of every half year computed from the present time, to be applied as a *Redemption-fund*, towards the ultimate discharge of debt, after the accumulation of that fund at compound interest until the 60th year expired; the question being, what capital of debt may then and by that means be redeemed. We have here $m = \frac{(1+r)^n - 1}{r} = \frac{(1{\cdot}025)^{120} - 1}{0{\cdot}025} = \frac{18{\cdot}35815}{0{\cdot}025} = 734{\cdot}326$, the quantity of times the half-yearly savings, and consequently 367·163 times their annual proportion; being the same result announced by the Table, (*page* 36th). The capital of debt which, in that case, may be paid off at the expiration of the 60th year, from this time, will be £350 × 367·163, or £128507.

(XXIV.) The general intent, the limits, and the practical use of the Tables that conclude this book, have already been set forth in a short prefatory discourse. Those Tables are *thirteen* in number; each embracing an extent of *four* pages, and referable to a certain standard rate of interest *per annum.* They exhibit under the several heads of *Improved principal,* of *Discounted principal,* of *Cumulated annuity,* of *Annuity for cumulation* (or *Redemption-fund),* of *Value of the annuity,* and of *Ratio of the annuity,* specific and numerical solutions of the *six* questions expounded in the preceding sections (XVIII to XXIII). All other details concerning the construction of those Tables would be superfluous. But it is necessary now to explain the further use to which they are applicable, for easily—though mediately—solving the questions that may arise in the 4th, the 5th, the 6th, the 8th, the 9th, and the 10th cases specified in *page* 40th; the 7th case being an exception, as already mentioned (XVII).

(XXV.) The clearest mode of proceeding, to that effect, will be to exemplify the questions susceptible of arising in each case, together with their respective solutions by means of the Tables. It should however be borne in mind, that in a great number of instances it will be found more expeditious to solve the questions by direct calculation, and according to the algebraic formulæ exhibited in *page* 40th; with the further advantage of rigid accuracy, which cannot otherwise be obtained in the results.

(XXVI.) CASE FOURTH, in which m, p, and r, are known quantities: Query n?

A principal of £25000 has improved by compound interest, at the rate of 3 *per cent.* in single payments annually, to a sum of £51500; and it is inquired in what period of time.

Reducing to *unity* the first of those sums, the proportion of Improved principal is 2·06; the Table (*page* 2d) indicates 2·0327941 as the improvement during 24 years, and 2·0937779 as that improvement extended to a 25th year: difference 0·0609838 for the last year. Now, 2·06 exceeds 2·0327941 by 0·0272059 only, which in proportion with the preceding difference is 0·446, or $\frac{163}{365}$ of the 25th year; whence the whole period of improvement has been 24 years and 163 days.

The direct calculation is . . . .

$$n = \frac{\log.\ m - \log.\ p}{\log.\ (1+r)} = \frac{4\cdot7118072 - 4\cdot3979400}{0\cdot0128372} = 24\cdot4498.$$

The same data, m, p, and r, being given: Query a?

An annuity stated to have been purchased for a capital of £13333. 6*s.* 8*d.*, at a time not mentioned, is now at its terminating period by the accretion of the last and half-yearly instalment of that annuity; and in consequence of the whole having been accumulated and improved at 3¼ *per centum* annual interest, but accruing also half-yearly from the time of purchase to the present, has created a capital of £66000. It is inquired, either the annuity or its half-yearly proportion, which by such accumulation and improvement has produced this result.

The principal £13333⅓ having ultimately produced £66000, the proportion of improvement is from *unity* to 4·95, which at 3¼ *per cent. per ann.*, or in the half-yearly ratio 0·01625, must have embraced a period between 49 and 50 years, according to the Table (*page* 8th). If 49 years, the improvement would have been 4·8534966; and if 50 years, 5·0125169; whence the difference, 0·1590203, is the improvement during the 50th year. But as the actual improvement has exceeded, by 0·0965034 only, that which corresponds with 49 years, this excess compared with the preceding difference represents an additional 0·6069, making the whole term 49·6069 years. We find in another column of the same Table, (*page* 9th,) that an annuity for the term of 49 years should be in the proportion 0·0084339, for every unit of the future capital it is intended to create by accumulation; and that the proportion of a 50 years' annuity should be only 0·0080997: difference for the last year, 0·0003342. The additional fraction 0·6069 of one year, being multiplied into this difference, produces 0·0002029 for the difference in the ratio, corresponding with that fraction of a year; and the latter quantity is to be *subtracted* from 0·0084339, as a longer term of the annuity must diminish its *ratio* or proportion with the capital. Hence 0·008231 will be the proportion of annuity, corresponding with every unit contained in £66000; and in that proportion, the latter capital is found to result from the accumulation and half-yearly improvement of an annual sum of £543·246, or very nearly £543. 5*s.* But if it be otherwise considered, that the fraction 0·3931 is wanting towards the completion of a term of 50 years; then by taking a similar proportion of the difference 0·0003342 already found, we have 0·0001314, which *added* to 0·0080997 (the ratio for 50 years), yields the same result 0·008231 as above.

It is observable that we have sought the precise Annuity, or *Redemption-fund*, corresponding with £66000 capital ultimately created; whereas the result of calculation would have been the same, if we had sought the *Ratio of annuity* corresponding with the original sum invested, say £13333. 6*s.* 8*d.*, and proceeded in the same manner; and again if we had sought the *Value of the annuity*, or the quantity of years' purchase, according to the Table (*page* 8th, *column* 6th).

The direct calculation, however, is $a = \dfrac{mr}{\left[\dfrac{m}{p}\right]-1} = \dfrac{66000 \times 0{\cdot}01625}{4{\cdot}95 - 1}$

$= \dfrac{1072{\cdot}5}{3{\cdot}95} = £271{\cdot}519$; this being accurately the half-yearly proportion of the annuity, the whole of which therefore £543·038.

(XXVII.) CASE FIFTH, in which a, p, and r, are known quantities: Query n?

A present capital of £1250 is given as the equivalent of an annuity of £132. 10s., by quarterly instalments, and the term of which now commencing to run; the rate of interest, admitted to govern the calculation, is $3\frac{1}{2}$ *per cent. per annum*, but understood as also accruing quarterly; and it is inquired the term of that annuity, or the quantity of its quarterly instalments that should be forthcoming.

Dividing 1250 by 132·5, we find 9·433962 years' purchase, the price of that annuity; and by the Table (*page* 10th, *column* 9th), an annuity at 9·433772 years' purchase (which differs from the above price but in a very insignificant fraction) should be of $11\frac{1}{2}$ years' duration, or 46 quarters.

If on the contrary 132·5 be divided by 1250, there will be found 0·106 the exact ratio of the annuity compared with the principal; and in the same Table (last column of the 11th page), that an annuity constituted in the ratio 0·1060021 should continue during $11\frac{1}{2}$ years: same result as above.

By direct calculation $n = \dfrac{\log. a - \log. (a - pr)}{\log. (1+r)} = \dfrac{\log. 33{\cdot}125 - \log. 22{\cdot}1875}{\log. 1{\cdot}00875}$

$= \dfrac{1{\cdot}5201559 - 1{\cdot}3461084}{0{\cdot}0037835} = 46{\cdot}0017$ quarterly instalments forthcoming.

The same data, a, p, and r, being given: Query m?

A capital of £50000 is to be invested, at 25 years' purchase, in an annuity payable by half-yearly instalments, and the term of which is agreed to be regulated by calculation, founded upon $3\frac{1}{4}$ *per cent.* rate of interest *per annum*, also accruing half-yearly; and it is inquired the sum to which that annuity, accumulated and improved at the said rate of compound interest, will amount at the period of its termination.

It is obvious that the ultimate sum, inquired after, should be the same as the improvement of the represented principal £50000, laid out at compound interest until the expiry of the annuity; and this period may be ascertained as in the preceding question.

The Table (*page* 16th) indicates the present value of a 74 years' annuity to be 24·96074, and that of a 75 years' annuity to be 25·02295 years' purchase; the difference in value for the last year of this term being consequently 0·06221. But the deficiency of the former value is only 0·03926, corresponding in due proportion with 0·631 additional fraction of a year; whence the term of the annuity should be 74·631 years. The Table further indicates, that any principal laid out at the above rate of interest should improve in 74 years to 15·631765 times its amount, and to 16.223452 times in 75 years, the difference being 0·591687; and if a part of the latter quantity, say 0·373354, in proportion with the fraction 0·631 of the 75th year, be added to 15·631765, we shall find 16·005119 for the ratio of improvement at the expiration of 74·631 years, or 74 years and 230 days. Hence, and by multiplying £50000 into that ratio, we find £800256, the future capital to result from the accumulation and improvement of a £2000 annuity accruing by half-yearly instalments of £1000 each.

The direct calculation, in algebraic form, does not require the term of the annuity to be previously ascertained: it gives at once, and with perfect exactness,

$$m = \frac{ap}{a-pr} = \frac{1000 \times 50000}{1000 - 50000 \times 0{\cdot}01875} = \pounds 800000.$$

Some inaccuracy is observable in the result obtained by the indirect method. It proceeds from having successively admitted certain proportional parts of value, to correspond with fractions of time in similar proportions, which is not strictly correct; whence the smallest deviation from rigid accuracy, in any one instance, may generate errors more considerable. Such, however, cannot acquire real importance in a practical point of view; but the direct method is always preferable.

(XXVIII.) Case Sixth, in which a, r, and m are known: Query n?

An annuity of £365, accruing by yearly instalments, accumulated and improved by compound interest at the rate of 4 *per cent.*, has ultimately produced a capital of £10660: it is inquired in what time?

Dividing $\frac{10660}{365}$, it is found that the annuity has accumulated in the proportion of 29·205479 for every unit; and by the Table (*page* 18th, *column* 2d), that the accumulation during 19 years should be in the proportion of 27·671229, whilst that during 20 years in the proportion of 29·778079; difference 2·10685. But the first proportion is short of a quantity only 0·5726, to correspond with a 20 years' accumulation; and :: 2·10685 : 1 :: 0·5726 : 0·27178, which last is the fraction wanting to the accomplishment of the 20th year; whence 19·72822 years is the required period of improvement.

If on the contrary we divide $\frac{365}{10660}$, the quotient 0·0342402 then expressing the annual redemption fund, or the proportion between the annuity and its cumulated amount; comparing this quantity with 0·0361386 and with 0·0335818, by the same Table (p. 19th, 2d col.), and calculating the differences in the same manner as above, the result will be 19·74249 years.

But from the cause already assigned in the preceding section, neither of those results are strictly accurate, and it is best to proceed with the direct calculation as follows:—

$$n = \frac{\text{log. }(a+mr) - \text{log. }a}{\text{log. }(1+r)} = \frac{\text{log. }(365 + 10660 \times 0{\cdot}04) - \text{log. }365}{\text{log. }(1{\cdot}04)} \;.\;.$$

$$= \frac{\text{log. }(791{\cdot}4) - \text{log. }365}{\text{log. }(1{\cdot}04)} = \frac{0{\cdot}3361031}{0{\cdot}0170333} = 19{\cdot}732 \text{ years, or 19 years}$$

and 267 days, the exact term of the accumulation and improvement.

The same data, *a*, *r*, and *m*, being given: Query *p*?

An annuity of £500, purchased at a time not specified, and the last half-yearly instalment of which is presently paid, has been accumulated and constantly improved at an interest nominally 4¼ *per cent. per annum*, but really of 2⅛ *per cent.* half-yearly, so as now to have become a capital of £10446. 5*s.*; and it is inquired the *principal*, or the original cost of that annuity, according to the above mentioned rate of interest.

It is clear, from the principal and the annuity being originally equivalent, that the former must be such as should have produced £10446. 5*s.*, by its improvement at compound interest during the implied term; which term, ascertained as in the preceding question, is 15 years and 40 or 41 days, say 15⅑ years. The improved principal, according to the Table (*page* 22d), is 1·8791528 at the expiration of 15 years, and 1·9190848 at the expiration of 15½ years; the difference for the last half-year being 0·0399320. If to 1·8791528 is added 0·0088738,—being the proportion of that difference corresponding with ⅑ of a year,—the result 1·8880266 will be the improvement of every unit contained in the principal; which therefore is found to have been

$$\frac{10446{\cdot}25}{1{\cdot}8880266}, \text{ or } £5532.\ 18s.$$

By the direct method, this question will be more accurately solved, even without previously ascertaining the term *n* of the annuity. We then have

$$p = \frac{am}{a+mr} = \frac{250 \times 10446{\cdot}25}{250 + 10446{\cdot}25 \times 0{\cdot}02125} = \frac{2611562{\cdot}5}{471{\cdot}9828125} \;.\;.$$

$$= £5533.\ 3s.\ 2d.$$

(XXIX.) Case Seventh, in which *a*, *m*, and *p*, are known quantities; whilst *r* and *n* are both unknown.

In this case, as already observed, neither of the questions arising can be solved by means of the Tables, which are expressly founded on the possession of the two data r and n; and in exemplifying those questions, their solution will be easily obtained by the direct method, as pointed out in *page* 40th. It is further observable, *first*, that the ratio r must be ascertained previously to the period of time n; and *secondly*, that the stipulation of instalments, whether annual, half-yearly, or quarterly, become a matter of indifferent consideration, provided that they be the same for the annuity a and for the ratio r of interest.

Example.—An annual fund of £4000 is supplied for accumulation and improvement at compound interest until it shall have created a capital of *One million*; that capital is, then only, to be applied for the discharge of present debts amounting to £86000, but admitted in the meantime to increase at compound interest also; and it is inquired, *first*, the rate of that interest at which the annual fund should be improved, in order that the debts may have accumulated to an equal amount of *One million* at the period of payment; and *secondly*, how far that period is removed from the present time.

SOLUTION.

$$r=\frac{a}{m}\left(\frac{m}{p}-1\right)=\frac{4000}{1000000}\left(\frac{1000000}{86000}-1\right)=\frac{10\cdot627907}{250}=0\cdot042511628,$$

which is the ratio of interest, exceeding by a very trifling fraction the rate of 4¼ *per cent. per annum*:

$$n=\frac{\text{log. } m-\text{log. } p}{\text{log. }(1+r)}=\frac{\text{log. } 1000000-\text{log. } 86000}{\text{log. } 1\cdot042511628}=\frac{1\cdot06550155}{0\cdot01808091}=58\cdot93,$$

or very nearly 59 years, the period of reimbursement of the debts, as accrued by compound interest, and without gain or loss on either side.

(XXX.) Case Eighth, in which m, n, and , are known : Query r?

A principal of £2400 has, by improvement at compound interest, quarterly instalments, produced £7211 at the expiration of 24 years: and it is inquired the nominal rate of that interest *per annum*.

The division $\frac{7211}{2400}$ quotes 3·0045833, the improvement of every unit contained in the principal; and by the Table (*page* 26th), 2·9269771 is the improved principal when the rate of interest is 4½, and (*page* 30th) 3·1058405 when it is 4¾ *per cent.*; the difference of improvement 0·1788634 corresponding with ¼ *per cent.* difference in the annual rate of interest. But the proportion of actual improvement has exceeded, by 0·0776062 only, the quantity relative to 4½ *per* *cent.*; and, as 0·1788634 : 0·0025 :: 0·0776062 : 0·0010847, the latter quantity added to 0·045 gives 0·0460847, the annual ratio of improvement, more accurately specified 0·0115212 the ratio *per quarter*.

By the direct method, $r \doteq \left[\frac{m}{p}\right]^{\frac{1}{n}} - 1 \doteq (3·0045833)^{\frac{1}{96}} - 1 \doteq 0·0115257$, the quarterly ratio, and therefore 0·0461028 the annual ratio; which last two results are correct, the above being only an approximation.

The same data, m, n, and p, being given: Query a?

A 24 years annuity, subject to quarterly instalments, has been purchased for £2400; which annuity cumulated and improved at compound interest, also quarterly, until the expiration of its term, has produced a capital of £7211; and it is inquired the ratio of that annuity, or its proportion with the principal, when understood that the purchase and the improvement were governed by the same rate of interest.

That rate of interest is 0·0460847, ascertained as in the preceding question. The ratio of an annuity for 24 years should be 0·0683526, when the interest is at 4½, and 0·0700563 when at 4¾ *per cent.*, according to the Table (p. 27th and 31st); difference 0·0017037, corresponding with ¼ *per cent.* difference in the annual rate of interest. The proportion :: 0·0025 : 0·0017037 :: 0·0010847 : 0·0007537 indicates that the latter quantity should be added to 0·0683526, whence 0·0691063 must have been the ratio of the purchase; and multiplying this ratio into £2400, we find £165. 17*s.*, the annuity purchased and improved as above.

The direct calculation, after having ascertained the quantity r to be correctly 0·0115257, is $a \doteq \frac{mr}{\left(\frac{m}{p}\right) - 1} \doteq \frac{7211 \times 0·0115257}{2·0045833} \doteq$ £41·4609, the quarterly instalment of the annuity; the whole of which therefore is £165. 16*s.* 10*d.*

(XXXI.) Case Ninth, in which a, n, and p, are known: Query r?

An annuity of £1750, the whole of which sum forthcoming at the expiration of the year now commencing and of every succeeding year to the 35th inclusive, is purchased for £28208. 8*s.* 6½*d.*, as its just equivalent; and it is inquired the rate of annual interest with which that purchase corresponds.

The division $\frac{28208·4271}{1750}$ quotes 16·11910, the quantity of years' purchase of that annuity; and $\frac{1750}{28208\cdot4271}$ quotes 0·0620382, its ratio or proportion with every unit contained in the principal. The departure may be taken from either of those results, but it is better to proceed upon the former. It is then perceived by the Table (*page* 36th), that an annuity such as the above is valuable at 16·37419 years' purchase, taking the annual rate of interest at 5 *per cent.* in a single payment, and (*page* 40th) that the same annuity is worth 15·87025 years' purchase when the interest is at 5¼ *per cent.*: difference 0·50394, corresponding with that of ¼ *per cent.* in the ratios of interest. If it be further considered that the purchase has been rated at 16·11910, differing by 0·25509 only from the valuation at 5 *per cent.*, the proportion :: 0·50394 : 0·0025 :: 25509 : 0·0012655 indicates that the ratio of interest, according to which the purchase was governed, must have exceeded by the latter quantity the ratio 0·05, or the rate of 5 *per cent.*; therefore 0·0512655, or 5·12655 *per cent. per annum*, (exceeding 5⅛ by a very trifling fraction) is the rate inquired after.

The direct mode of calculation is somewhat more intricate in this than in the preceding cases, and requires first to ascertain *three* quantities, b, d, and f.

According to the demonstration in *section* XVth, we have . . . . . .
$b = \frac{6}{n-1}$, $d = \left(\frac{an}{p}\right)^{\frac{2}{n+1}}$, $f = b - 2\,(d - 1)$, and consequently .
$r = b - \sqrt{(bf)}$, which will afford an approximate solution of the question.

We find $b = \frac{6}{n-1} = \frac{6}{34} = 0{\cdot}17647059$,

$$d = \left(\frac{an}{p}\right)^{\frac{2}{n+1}} = \left(\frac{61250}{28208{,}4271}\right)^{\frac{1}{18}} = (2{\cdot}1713399)^{\frac{1}{18}} = 1{\cdot}04401576,$$

$$\text{and } f = b - 2\,(d-1) = 0{\cdot}17647059 - 0{\cdot}08803152 = 0{\cdot}08843907\ ;$$

whence $r = b - \sqrt{(bf)} = 0{\cdot}17647059 - (0{\cdot}17647059 \times 0{\cdot}08843907)^{\frac{1}{2}}$
$= 0{\cdot}051543$.

It is worthy of observation that the true ratio of interest should be *exactly* 0·05125, or 5⅛ *per cent.*, as proved by admitting this datum and stating the converse questions.

This 9th case, as well as the 10th hereafter exemplified, are two cases of exception, in which the questions they involve may be solved with a nearer approach to rigid accuracy by means of the Tables, than by the direct method; as instanced in the discrepancies of the two results above. The first, 0·0512655, exceeds the exact quantity by a very trifling fraction only; and by explaining the cause of this difference, however small, it will account for all analagous deviations from exactitude in the results indirectly given by the Tables, in the seven cases from the 4th to the 10th inclusive.

The value of a 35 years annuity, interest at 5¼ *per cent.*, is 15·87025, and at 5 *per cent.* it is 16·37419, the difference being 0·50394. But we also find, by the Table (p. 32d), that the value increases to 16·90390 when interest is at 4¾ *per cent.* only; the difference from the value at 5 *per cent.* being then 0·52971, which is more considerable than the former difference. Now, if, for two equal differences of interest the corresponding differences in value of the annuity are generally unequal, it is evident that the proportion set forth in the preceding page, and producing for its fourth term the quantity 0·0012655, cannot be strictly correct; and it is evident also that this quantity must be rather too considerable, because one half of the difference 0·50394, or 0·25197, is a reduction too small from the value 16·37419 of an annuity calculated at 5 *per cent.* for corresponding with an increase of ⅛ *per cent.* in that rate of interest, considering that we have perceived the differences in value to increase in a progressive ratio, with reference to corresponding but equal reductions in the rate of interest.

The same data, a, n and p, being given: Query m?

An annuity of £1750, during 35 years, is purchased for £28208. 8*s.* 6½, as above mentioned; and be it inquired the amount of which it is susceptible, by accumulation and improvement at compound interest until the expiration of that term; the rate of such interest not specified, but understood to be the same that established an equivalent in the purchase.

The amount, by accumulation of an annuity purchased for £28208. 8*s.* 6½*d.*, will at the end of its term be the same as this represented principal improved at compound interest during that term. But, towards solving the question by means of the Tables, a reference is required to the ratio of interest 0·0512655 already found, although we are aware of some inaccuracy in this result. According to the Table (p. 36th), the improvement of every unit in the principal is 5·5160154 at 5 *per cent.*, and (p. 40th) is 5·9947856 at 5¼ *per cent.*; difference 0·4787702. Taking therefore a due proportion of that difference :: 0·0025 : 0·4787702 :: 0·0012655 : 0·2423535; and adding the latter quantity to 5·5160154, we obtain for the assumed improvement (at the ratio of interest 0·0512655) a quantity 5·7583689, which multiplied into £28208. 8*s.* 6½*d.* produces £162435, the *Cumulated annuity*.

By the direct method of calculation, we have $m = p\ [b + 1 - \surd(bf)]^n$ $= 28208{\cdot}4271\ (1{\cdot}051543)^{35} = 163804{\cdot}3$, or £163804. 6*s.*

The rate of interest being exactly 5¼ *per cent.*, as already observed, we should have obtained (exactly also) 162214·3108, or £162214. 6*s.* 2½*d.*, for the Cumulated annuity, if the formula had admitted a rigorous solution.

(XXXII.) CASE TENTH and last; in which a, m and n, are known: Query r?

An annuity of £450, during 45 years, and the 90th or last half-yearly instalment of which is now received, has by uninterrupted improvement at compound interest, from the commencement of that period, accumulated to a capital of £82706. 10*s.*; and it is inquired the rate of interest productive of this result.

The division $\dfrac{82706{\cdot}5}{450}$ quotes 183·79222, as the proportion according to which every unit contained in the annuity has increased by accumulation and improvement. The Table also indicates (p. 40th) that the proportion should be 177·11041 when interest is at 5¼ *per cent.*, and (p. 44th) 190·74879 when it is at 5½ *per cent.*, accruing half-yearly in both cases; the difference 13·62938 corresponding with that of ¼ *per cent.* in the rate of interest. But the excess, of 183·79222 over the proportion relative to 5¼ *per cent.*, is only 6·67281; whence :: 13·62938 : 0·0025 :: 6·67281 : 0·001224, and the latter quantity added to 0·0525 establishes at 0·053724 the ratio of annual interest productive of the improvement announced.

The following is the direct calculation, in which $n = 90$ the quantity of half-yearly instalments, and $a = 225$ the portion of annuity accruing at each.

We have first to ascertain *three* quantities; c, e and g, as already observed in *Section* XVth:—

$$c = \frac{6}{n+1} = \frac{6}{91} = 0{\cdot}06593407,$$

$$e = \left(\frac{m}{an}\right)^{\frac{2}{n-1}} = \left(\frac{82706{\cdot}5}{225 \times 90}\right)^{\frac{2}{89}} = (4{\cdot}084271605)^{\frac{2}{89}} = 1{\cdot}03212646,$$

and $g = 2(e-1) + c = 0{\cdot}06425292 + 0{\cdot}06593407 = 0{\cdot}13018699$;

whence is ultimately obtained . . . .

$r = \surd(cg) - c = \sqrt{0{\cdot}06593407 \times 0{\cdot}13018699} - c - 0{\cdot}09264857 = 0{\cdot}06593407$

$= 0{\cdot}0267145$, the half-yearly, and therefore 0·053429 the annual ratio of interest

The same data, *a*, *m* and *n*, being given; Query *p*?

Let the case be the same as in the preceding question, and be it inquired the sum for which the annuity of £450 should have been originally purchased; calculating on the same ratio of interest whence resulted £82706. 10*s*., the *Cumulated annuity*, though that ratio is kept out of view.

The use of the tables requiring a reference to the ratio of interest, it must first be ascertained; and having as before mentioned found that ratio 0·053724, exceeding by a quantity 0·001224 the ratio 0·0525, we proceed as follows:—

By the Table (p. 40th), an annuity for 45 years, when the rate of interest at 5¼ *per cent. per ann.* is accruing by half-yearly instalments, has the value of 17·19812 years' purchase, and (p. 44th) it has the value of 16·59958 when the interest is 5½ *per cent.*; the difference corresponding with ¼ *per cent.*, or with 0·0025 in the ratio, being 0·59854. The proportion :: 0·0025 : 0·59854 :: 0·001224 : 0·29305 indicates that the latter quantity should be *subtracted* from 17·19812, as the value of an annuity decreases when the rate of interest increases; whence the annuity of £450 was originally valuable at 16·90507 years' purchase, therefore represented a principal of £7607. 5*s*. 7½*d*.

By the direct method (pointed out in *Section* XVth, *page* 40th) we have

$$p = \frac{m}{[\surd(cg)+1-c]^n} = \frac{82706\cdot5}{(1\cdot09264857 - 0\cdot06593407)^{90}} = \frac{82706\cdot5}{(1\cdot0267145)^{90}}$$

$$= \frac{82706\cdot5}{10\cdot726856} = 7710\cdot2275, \text{ or } £7710.\ 4s.\ 6d.$$

But it has been observed in the foregoing part, that even this direct method of calculation affords only an approximate solution; the present and the preceding cases being, in that respect, two exceptions amongst the series of *ten* cases. The rate of interest should have been exactly 5⅜ *per centum per annum*, or 0·026875 for the *half-yearly ratio*; and the *principal* should have been (also exactly) £7602. 10*s*. 4*d*., corresponding with an annuity of £450, so as to produce by accumulation a capital of £82706. 10*s*. at the expiration of 45 years; all which may easily be proved by the converse calculation.

(XXXIII.) Before proceeding to elucidate various other questions, some of which assume a complicated character, and that may occasionally arise from the consideration of compound interest in its multifarious modes of operating, it is proper to revert to the *six* questions comprised under the first three general cases set forth in Section XVth, and the solution of which only could be exhibited in the shape of tables destined for habitual reference. As the purpose of those tables, that form the concluding part of this work, is exclusively practical, their construction and use require to be clearly explained; which will render their application easy for the most simple understandings.

On opening the book at any part of these tables, *eighteen* columns, each containing a series of results of calculation, obviously following a progression whether of increasing or of decreasing quantities, offer themselves in a synoptical view, with reference to a specific rate of annual interest, there indicated, and which is always one of the *three data* required towards solving any question. Independently of those eighteen columns, each page begins with a smaller column of quantities regularly increasing, and indicating certain periods of time, for the purpose also of reference as a *second datum;* and it should be distinctly understood that this second reference governs, for the whole horizontal line at the head of which it is placed, the *nine* results of calculation there contained.

From this construction and disposition of the tables, as also towards their intelligence and convenient application, it became necessary that the *third* indispensable datum should be, altogether, uniform and such as the mind could retain without effort: *unity* has therefore been adopted for invariably representing that *third datum*, of whatever description it might be; and with the greater reason, as variable data could not in this instance have found any place for insertion. If then it be borne in mind, that whatever the third and variable datum,—as supplied by the statement of the question itself,—it must always carry the same proportion with the quantity inquired after, as the proportion existing between *unity* and the quantity expressed by the table in the appropriate column, and in the line indicated by the period of years referred to, no difficulty can remain in obtaining at a first inspection into the proper table the answer to any of the six questions it is intended to solve.

By successively exemplifying the solution of those questions, this matter will be placed in the clearest light possible. But it is necessary first to observe, that each page of the tables being divided into *three* parts, similar in their general indications, yet diversified in the results they exhibit with reference to the same periods of time, and according as the specified rate of interest *per annum* may be understood to accrue—by annual—by half-yearly—or by quarterly instalments, there is always one of those three divisions which must exclusively be referred to for the required answer; avoiding, in all instances, to confound that proper division with either of the two others.

(XXXIV.) First Question:—The *Improved Principal.*

If it were inquired the sum to which a present capital of £3600 is susceptible of being improved at the expiration of 12¼ years, by compound interest accruing quarterly, and at the nominal rate of 3 *per cent. per annum*; it would be found by the table (*page* 2d, *column* 7th), that every *unit* of that capital should then be improved into 1·4638541; from which is to be inferred, in the same proportion, that the whole £3600 ought to improve into a sum of £5269. 17*s.* 6*d.*

But supposing the question to be concerning that improvement at the expiration of 120 years, a period exceeding the limits of the tables; it is then evident, that whatever the sum to which every unit contained in the original principal will have improved at the end of half that period, or at the expiration of 60 years only, every unit contained in that improved principal will again have improved in the same proportion at the end of a second and similar period. Therefore, and as we find (*page* 4th) that the improvement for the first 60 years should be in the proportion of 6·0091516 for every unit of the original principal, it must be inferred that this quantity multiplied into itself, the product of which is 36·109903, expresses the proportion of improvement corresponding with 120 years; and consequently, the original principal £3600 will then have improved to the sum of £129995. 13*s.*, admitting the same rate of interest to have been constantly available. The same result would be obtained, if the proportion of improvement corresponding with 100 years were multiplied into the proportion corresponding with the 20 years remaining, or generally by multiplying the respective proportions of improvement corresponding with any two periods forming together that of 120 years.

(XXXV.) Second Question:—The *Discounted Principal.*

This question is exactly the converse of the preceding.

Be it inquired the present value of £10000, forthcoming at the expiration of 30 years; the interest supposed at 3½ *per Cent. per ann.*, and accruing half-yearly.

It will be found (*page* 9th, *column* 4th), that every unit comprised in that forthcoming capital is, with reference to the specified period, reducible to she proportionate fraction 0·3801601; whence £3801·601, or £3801. 12*s.* 0¼d., is the present value of the £10000 above stated.

But if the proposed discount should relate to any period exceeding the limits assigned to the tables, then multiply into each other the proportionate decimal fractions, as there expressed with reference to any two periods into which the given period is susceptible of being divided; and the further reduced fraction, thence resulting, will express the discounted value of every unit contained in the capital forthcoming at the remote period supposed.

(XXXVI.) Third Question:—The *Cumulated Annuity.*

A sum of £500 is to be annually received in a single payment, the first of which at the expiration of the year now commencing; that annuity is to be accumulated and improved at 3½ *per cent.* compound interest during 25 years, being the period at which its last instalment will be forthcoming; and it is inquired the Cumulated amount of such annuity, or the capital it will have created when its term is expired.

Assuming that the improvement at compound interest is also to take place from one year to another, and not half-yearly, nor quarterly, (which otherwise would complicate the question,) it will be found in the Table (*page* 10th, *column* 2d,) that on the accomplishment of the 25th year, every unit of the annual income must have created 38·949857 capital; whence £500 of such income will, in due proportion, have created a capital of £19474. 18*s.* 6*d.*

(XXVII.) Fourth Question:—The *Annuity for Cumulation,* or the *Redemption-fund.*

The question here exemplified is converse of the preceding.

A capital of £125000 is required at the expiration of 45 years from the present time; and it is questioned the annual provision that should be made, by half-yearly instalments, the first commencing six months hence, so as to create the above mentioned capital by means of those savings improved at compound interest, also half-yearly, and at the annual rate of 3½ *per cent.*

We find in the Table (*page* 17th, *column* 5th), that every unit of capital to be provided at the stated time requires an annual saving of 0·0086763;-whence and from multiplying £125000 into that fraction, it follows that £1084·5375, or £1084. 10*s.* 9*d.*, is the Redemption-fund required to be annually appropriated to the above effect, by half-yearly instalments of £542. 5*s.* 4½*d.* each.

(XXXVIII.) Fifth Question :—*Value of the Annuity.*

Supposing the rate of interest 4 *per cent. per annum*, but available by quarterly instalments; it is inquired the capital which should be given as the equivalent for an annuity of £ 480, also accruing quarterly, and to terminate at the expiration of 14¼ years from the present time, its last instalment then forthcoming.

It will be found, in the last column of the table (*page* 18th); that every unit of the annuity of that description has the value of 10·96216, which is commonly called the quantity of *years' purchase*; whence the annuity of £480 is valuable according to the product of those two quantities multiplied into each other, which is £5261. 16*s*. 9*d*., the present equivalent.

(XXXIX.) Sixth Question :—*Ratio of the Annuity.*

This is the converse of the preceding question, it being here required the proportion which a terminable annuity should bear with the price at which it is purchased.

Suppose £13333. 6*s*. 8*d*., the principal proposed for investment in an annuity payable by half-yearly instalments, the first of which in six months from this time, and the last at the expiration of 36 years; suppose also the given rate of interest, for ascertaining the value of the annuity, to be 4½ *per cent. per annum*, but accruing half-yearly; and it is inquired the annuity itself, or the income limited to 36 years, corresponding with the above mentioned capital.

By the table (*page* 25th, *column* 6th), it is found that every unit of the principal should produce 0·0544896, as the corresponding annuity; which proportion multiplied into £13333. 6*s*. 8*d*., the stated principal, indicates £726. 10*s*. 6*d*. as the equivalent and annual income that it should yield.

(XL.) It is obvious that the ratio of a terminable annuity, however extended the duration of the latter, should always be superior to the ratio of perpetual interest which, under the admission of an equal security, a certain capital might command at the time being; although in case of very long annuities the difference of the ratios may be only inconsiderable. If it be further considered, according to the principles from which we took our departure, that an annuity limited to a certain term of years is not any thing else than the adjunction, with the simple interest, of a periodical surplus adequate to produce, by accumulation and improvement at compound interest until the expiry of that annuity, another capital equal to the one sunk in the original investment necessarily follows that, in all the Tables applicable to the solution of the foregoing questions, each of the quantities expressed in the column indicating the *Annuity for cumulation* (meaning the *Redemption-fund*) should differ from the corresponding quantity as stated in the column expressing the *Ratio of Annuity*, by a quantity never more nor less than the precise rate of simple and annual interest of money; and this coincidence will always be observable throughout the Tables, although the calculations have been executed for both columns independently of each other.

(XLI.) On the other hand, the *Ratio of the annuity*, and its counterpart the *Value of the annuity*, are reciprocal quantities, such as invariably to produce *unity* by multiplying them into each other; and therefore such, also, as that the division of unity by either should yield for its quotient the other quantity.

Thus, in the same manner as the column entitled *Ratio of the annuity* exhibits a series of decreasing quantities, whilst the corresponding periods of reference increase, so the other column entitled *Value of the annuity*, exhibits a series of quantities increasing simultaneously with the enlargement of the periods of time to which they refer.

(XLII.) The *Value of the annuity* is a quantity having further an immediate dependence upon other quantities expressed by the Tables. First, it is the quotient of the *Cumulated annuity*, divided by the *Improved principal*; and secondly, it is the sum total of the discounted values of the successive portions of annuity forthcoming to its last instalment inclusive. This last position has been demonstrated (*Section* IXth), and is exemplified by summing up the quantities expressed in the column entitled *Discounted principal*, for any period of time where the instalments are supposed annual; but the same verification is impracticable with reference to half-yearly and to quarterly instalments, as the intermediate quantities corresponding with portions of years, and which should also be taken into the account, are omitted in the tables beyond the 16th year. It should be observed, that what is there termed the *Discounted principal* is, precisely the same as the *discounted instalments* of the annuity; both referable to *unity*, considered as the forthcoming sum.

(XLIII.) It is obvious again that the value of an annuity, accruing by full yearly payments, must be more or less inferior to the value of a similar annuity accruing by half-yearly instalments; and that the latter value must also be less than the value of an annuity to the same amount but accruing in due proportion, at the expiration of each quarter of a year. That such differences whatever should exist, in the value of similar annuities, is immediately accounted for in consequence of the earlier accretion, during each succeeding year, of certain portions of the annuity, in one case than in another.

Respecting the law of those differences, Dr. Price has inadvertently made the erroneous remark, that *they continually decrease as* n *(the period of time) increases, till at last it vanishes, when* n *becomes infinite or the annuity is a perpetuity.* Dr. Hutton has come nearer to the truth, when observing that for any given rate of interest, those differences of value *first increase as the term* n *increases, unto some certain finite term when the difference is a maximum; and that afterwards, as* n *increases more, that difference will continually decrease to nothing again.* Mr. Baily merely observes on this subject, but without elucidating the facts, that he has no where seen them set in their proper point of view; and the writer of a late pamphlet, of no very moderate pretensions [*], though exulting in the detection of those and of other discrepancies, whether real or only apparent, equally fails to clear up the points of contention.

The reality of this case is, however, that the difference or excess of value of any annuity for terms of years, when the instalments approximate each other, over the value of a similar annuity the instalments of which are more distant, continually increases until a period n of years *equal to the quantity of years' purchase of a perpetual annuity* according to the given rate of annual interest, or (mathematically expressed) until a period $n = \frac{1}{r}$, be this annual ratio r what it may; the progression of which increase, or the second order of differences, proceeds by a series of *decreasing* quantities. After that period, the difference of which we are speaking commences to decrease, thus proceeding during *another period of similar extent*, whilst the second order of differences forms a series of *increasing* quantities; and after that second period accomplished, the differences of value continue to decrease until the remotest term imaginable, or until the annuity becomes perpetual, but the progression of decrease, or the second column of differences, then proceeds by a series of quantities *decreasing* also. It is thus, and in consequence of a somewhat more considerable acceleration in those progressions, (particularly the latter,)—when the differences considered are those between the half-yearly and the quarterly, than when considered between the annual and the half-yearly,—that all such disproportions ultimately disappear, and that a *perpetual* annuity becomes valuable in the same proportion, exactly, whether the instalments be paid annually, half-yearly, quarterly, or even momently; provided always, that the ratio of interest, which governs the calculation, be admitted to accrue by *instalments similar with those of the annuity* with which that ratio is brought into comparison. But if otherwise, and supposing (for example) the value of an annuity by half-yearly or by any shorter instalments, to be calculated from a rate of annual interest accruing in one single payment, it is very certain that instead of assimilating at the period of perpetuity, with the value of an equal annuity accruing in one single and yearly payment—such value calculated according to the same stipulation of interest,—the respective values of the similar annuities, but subject to different intervals of instalment, would then diverge *ad infinitum*.

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[*] INVESTIGATION *of the errors of all writers on Annuities, in their valuation of Half-yearly and Quarterly payments; including those of Sir Isaac Newton, Demoivre, Dr. Price, Mr. Morgan, Dr. Hutton, &c. &c.; by* WM. ROUSE, *London*, 1816.

This writer has taken great pains merely to prove truisms. According to his hypothesis, 4 *per cent.* annual interest does not imply that any division of this ratio should mathematically correspond with a similar division of the year, so as in the present instance (for example) to justify the expression of *one per cent.* interest quarterly; and he insists, that such quarterly or other partial payments of the interest should be such as to improve *unity* (the principal) exactly to 1·04 at the expiration of the four quarters of the year, whence the quarterly ratio ought in that case to be expressed by 0·0098533, and not by 0·01.

Nothing can be more concordant than this mathematical position; and it is very certain that *unity*, improved in the ratio 1·0098533 at the end of a first quarter, will in the same ratio become 1·0198039 at the end of the second, 1·0298524 at the end of the third, and exactly 1·04 at the expiration of a whole year. Even the most humble of Sir Isaac Newton's successors could not be unaware of this. But the respectable authors animadverted upon with uncalled for severity, in that pamphlet, could not have made themselves understood had they not admitted, according to the expressions generally received, the quarterly ratio of 1 *per cent.*, as also the half-yearly ratio of 2 *per cent.*, equally to correspond with a *nominal* ratio of 4 *per cent. per annum*, although these are three different things. Their calculations, in this respect, neither involve nor lead to any error on the part of those who rightly understand the positions: a different view of the case inducing different results, however, *in figures.*

(XLIV.) In the same manner as any half-yearly or quarterly ratio of interest is admitted, by common consent and without any alteration in those proportions, to correspond as aliquot parts of a certain ratio of interest per annum,—though the latter ratio should then be understood as nominal only,—so the ratio of annuity, as expressed by the Tables, should only be considered as nominal when subject to the condition of being paid either by half-yearly or quarterly proportions. We cannot too much impress our readers with the necessity of keeping these and other analogous distinctions constantly in view; by which may sometimes be avoided very gross mistakes.

(XLV.) The simplest reasoning, no less than the inspection of the Tables, shews that quarterly rates of interest improve a capital faster than it could be improved by half-yearly rates; and still faster than by undivided annual rates. Should we suppose such interest to accrue daily, still maintaining a corresponding proportion, the progression of improvement would then be further accelerated; and following up the same principle, even to the fiction of interest accruing *momently* in a proportionate ratio, this would have the effect of carrying to its utmost limit the rapidity of that progression. To indulge in contemplations such as the latter may be divested of practical utility, but those researches of analogical truth, though otherwise useless, have a general tendency to rectify and to invigorate the powers of ratiocination; hence shall presently be considered some of the results attending the *momently* accretion of interest.

(XLVI.) In like manner with the proportion of increase of the Improved Principal, by lapse of time, the proportion of corresponding increase of the Cumulated Annuity (which the authors have technically called the *Amount*) is remarkably greater when the instalments are brought nearer to each other. For example: *One million* annually appropriated, as a fund for the redemption of the national debt, and improved at the rate of 4 *per cent.* compound interest, would,—in case of that sum being undivided, and of the progression of accumulation and improvement taking place from year to year,—be adequate to discharge at the expiration of the 90th year 828 *millions* capital of debt; if invested and improved half-yearly, a capital of 858 *millions*; and if quarterly, £873,741,030 of such national debt.

(XLVII.) We have already noticed the corresponding effect of accelerated instalments upon the value, in present capital, of annuities constituted for terms of years. But it may be worthy of remark, that all those effects are reversed when the comparison is made between annual, half-yearly, quarterly, and even momently instalments, with the condition of *advancing* each instalment of the interest or annuity; that is to say, that the income should accrue at the beginning instead of the end of the year, half-year, &c., respectively. It is obvious then, and in consequence of such early accretion of income being greater as the instalments are farther removed from each other, that the Improved principal, as also the Value of the annuity, must be more considerable when the instalments are annual than when half-yearly, more so in the latter case than when the instalments are quarterly, and still more so than when momently. In this last supposed case, there would be no acceleration whatever of income; the two modes coinciding.

It is observable, however, that the consideration of advanced instalments of the annnity may be wholly discarded in treating the questions of compound interest; as such advance of 12, 6, or 3 months income, operates not otherwise than as a reduction from the represented principal, or from the price at which the annual income may have been purchased.

(XLVIII.) Notice has been taken (XL, XLI and XLII,) of certain invariable relations between each of the quantities expressed in the Tables, under the heads either *Ratio of the Annuity* or *Value of the Annuity*, and other quantities expressed with reference to the same period of time and rate of interest. It is further observable, that each of the quantities there expressed under the head *Cumulated Annuity*, is so related with others expressed in the same horizontal line, as constantly to maintain, between the *Value of the Annuity* and the *Cumulated Annuity*, a proportion identical with that subsisting between the original *Principal* and the quantity of its *Improvement* at compound interest. This identity of proportion, $p : m :: 1 : (1+r)^n$, follows indeed from the definition of those general quantities; whence is to be remarked, that the sum into which any principal may be improved—whatever the time allotted for such improvement and whatever the rate of interest—is equal, in all cases, to the capital susceptible of being created at the expiration of the stated period, by the accumulation and improvement of the annuity which might have been purchased with the same original principal. In consequence of this, if the Cumulated amount of a quantity whatsoever of successive instalments of the annuity should be reconverted into another annuity, to endure a similar period, commencing when the last of those instalments became due, the two annuities would bear with each other the same proportion as the original principal bears with its improvement at Compound interest at the expiration of the term of such accumulation; provided that the rate of interest and the intervals of the instalments were to continue as before. Any of the Tables selected at pleasure, with reference to whatever period of time, will corroborate this position.

Suppose the rate of Interest 3½ *per cent. per annum*, and the instalments half-yearly; an annuity of *One pound* will by accumulation and improvement during 25 years, create a capital of £40·84049, which converted into another annuity limited to a similar term, and valuable at 16·1328 years' purchase, establishes the *quantum* of the latter annuity at $\frac{40{\cdot}84049}{16{\cdot}1328} = £\,2{\cdot}53152$, being also the improvement at Compound interest of *One pound* Principal, at the expiration of 25 years (Table, *page* 14th).

(XLIX.) At the head of each table of Compound Interest, and with reference to the annual rate according to which that table has been calculated, is specified the corresponding value of public securities, or of any *Stock* supposed to be funded at the several rates of 3, 3½, 4, and 5 *per centum*, perpetual interest *per annum*; but it should be understood that those assimilations of respective value essentially rest on various admissions, without which the comparisons become illusory.

First, it must be admitted that the instalments of periodical income, whether annual, half-yearly, or quarterly, are the same in both instances compared; as otherwise we should fall within the series of anomalous cases, requiring distinct and complicated calculations for solving the question.

Secondly, the compared price of Stock must be exclusive of any acquired claim, arising from the time elapsed since the last dividend became due. As each quoted price of Stock is compounded of two parts,—the portion of interest accrued since the last dividend took place,—and the price of the bare Stock, considered as an investment of capital producing interest from the date at which it is made; it follows that at any intermediate period between two dividends, a proportionate subtraction should be made from the quotation, in order to establish the real price exclusive of any portion of future dividend then acquired, and the whole of which dividend it is customary to transfer with the Stock itself.

Thirdly, the compared values necessarily rest on the admission that the holders of the Stock are indefinitely secured against any disadvantage depending on the possibility of its early redemption at par. Without this last consideration, and supposing (for example) a Stock funded at 4 *per cent.*, being presently valuable above par; if such Stock were redeemable at pleasure by the Government,—or if not being actually so, it were to become redeemable at the expiration of a limited period of forthcoming years,—the proportion of its corresponding value, as stated in the Tables, would then be only imaginary, and could not be received as a just comparison.

(L.) The differences in the present value of annuities, according to the specific distribution of their instalments, have already been considered (XLIII. and XLVII.) But reverting to the equation $p = \frac{a[(1+r)^n - 1]}{r(1+r)^n}$, set forth (XV. and XXII.) as a general expression of the value of annuities, a decomposition of that general expression will exhibit at a single glance the comparative values, in the several cases where the annuities may be accruing annually, half-yearly, quarterly, or otherwise, and even momently; the latter, though merely a fiction, shewing the utmost value of which an annuity is susceptible, according to the specific rate of interest admitted to govern the calculation.

If we take $a = 1$; so that the value, as expressed by p, may be exactly the quantity of years' purchase of the annuity; the above-mentioned equation will then be simplified into $p = \frac{(1+r)^n - 1)}{r(1+r)^n}$, which is identical with . . . . $p = \frac{1}{r} - \frac{1}{r(1+r)^n}$; and $\frac{1}{r}$ will always express the present value of the Perpetual Annuity, or its relative quantity of years' purchase. Considering r as the ratio of interest to correspond with a whole year; further admitting any subdivisions of that ratio (thus become merely nominal) proportionately to correspond with similar subdivisions of the year, whether into half-years, quarters, &c. even into indivisible moments; and again if we admit, instead of the general expression p of value, the more particularized expressions p_a, p_h, p_q, p_x, and p_m, it is evident that we shall comparatively obtain—

$p_a = \frac{1}{r} - \frac{1}{r(1+r)^n}$, the value when the Annuity and the Rate of interest are both considered in one single and *yearly* payment; . . . .

$p_h = \frac{1}{r} - \frac{1}{r(1+\frac{r}{2})^{2n}}$, the value when the Annuity and the annual Rate of interest are both considered by *half-yearly* instalments; . . . .

$p_q = \frac{1}{r} - \frac{1}{r(1+\frac{r}{4})^{4n}}$, the value when the Annuity and the annual rate of interest are both considered by *quarterly* instalments; . . . .

$p_x = \frac{1}{r} - \frac{1}{r(1+\frac{r}{x})^{xn}}$, the value when the Annuity, as well as the annual rate of interest, are both considered to accrue by instalments dividing each year into a quantity whatever x of equal parts; . . . .

and $p_\infty = \frac{1}{r} - \frac{1}{r(1+\frac{r}{\infty})^{\infty n}}$, the value when the Annuity, as also the rate of yearly interest, are equally considered as accruing in similar proportion at each indivisible moment*.

The equation p_∞, expressing the utmost relative value which any annuity can possess, in consequence of admitting it to accrue even by momently instalments, is reducible to a more simple expression through the developement of the series involved in the binominal quantity $\left(1 + \frac{r}{\infty}\right)^{\infty n}$. That developement produces

$$1 + \frac{rn}{1} + \frac{r^2n^2}{1\times2} + \frac{r^3n^3}{1\times2\times3} + \frac{r^4n^4}{1\times2\times3\times4} + \frac{r^5n^5}{1\times2\times3\times4\times5} + \&c.\ldots$$

ad infinitum; the summation of which series yields precisely the quantity that has rn for its Hyperbolic logarithm, or in Neper's system, and equally has for its ordinary and tabular logarithm $rn \times 0{\cdot}43429\ 44819\ 03251\ 82765\ldots$ &c., according to Briggs's system of Logarithms, having the latter and infinitesimal fraction for its *modulus*. Therefore, admitting N to represent such implied quantity, we obtain $p_m = \frac{1}{r} - \frac{1}{rN}$; and supposing, for example, an annuity of 25 years' duration, subject to momently instalments, and the rate of interest at 4 *per cent.* accruing in the same manner, we find . . . .

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* We must be permitted here to remark, on Dr. Price's theorems analogous to the above, that from his omitting to state the indispensable requisite (with which it should be supposed he was acquainted), of assimilating the instalments of the valued annuity, with those of the governing rate of interest, many of his readers are not unlikely to be betrayed into false conclusions.

$$p_m = \frac{1}{0\cdot04} - \frac{1}{0\cdot04N} = 25 - \frac{25}{2\cdot71828\;18284\;59\ldots} = 15\cdot80301 \text{ years'}$$

purchase[*]. Thus the value of a 50 years' annuity will also be found 21·61662; and that of an annuity for 100 years, 24·54211 years' purchase,—at the same rate of interest and under the similar condition.

For a last example, let us suppose an annuity for 48 years, and the rate of interest 3½ *per cent. per ann.*; the value of that annuity being 23·09125, if in a single yearly payment, 23·16852 if by half-yearly instalments, and 23·20740 if quarterly, (all which results are stated in *page* 12th of the Tables); its value, in the hypothesis of momently instalments, will be . . . .

$$p_m = \frac{1}{0\cdot035} - \frac{1}{0\cdot035N} = \frac{200}{7} - \frac{200}{7\times5\cdot365556} = 23\cdot24646,$$ in consequence of 5·365556 being the *hyp. log.* of $\frac{7\times48}{200} = 1\cdot68 = rn$.

Those, and analogous calculations, prove that only an inconsiderable increase, as to the real value of annuities, is obtainable by reducing the intervals of their instalments to a less time than 3 months.

(LI.) Leaseholds and various other descriptions of property, when their annual income is susceptible of ascertainment, or of being reduced to a valuation founded upon satisfactory probability, may be assimilated in all respects to annuities for terms of years and which have been hitherto the subject of our consideration. A question not unfrequently recurring is that of the fines due, at an equitable valuation, for the renewal of unexpired leases; and the rule for solving such questions is of the greatest simplicity. The renewed lease is valuable as an annuity for the whole term of that lease, and its value may be immediately ascertained by the Tables of Compound-Interest, after having determined the standard rate of interest by which the calculation is to be governed. On the other hand, the unexpired part of the old lease is valuable on the same principle; and the value of the latter being subtracted from that of the former, exhibits a remainder which is the value of the renewal, or the pecuniary consideration justly due.

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[*] Dr. Price has erroneously stated the result as 15·8010; and has also stated 15·7694, instead of 15·75722, as the value of a 25 years' annuity, at 4 *per cent.* interest, quarterly instalments.

First Example.—A leasehold or equivalent property, producing a clear annual income of £350 and accruing by half-yearly instalments, has 7½ years unexpired; the renewal is proposed for 21 years, computed from the present time; and it is inquired the fine that should be paid on that transaction, the interest of money being considered at 5 *per cent. per ann.*, also by half-yearly instalments. The Table (*page* 34th) shews the new lease to be worth exactly 12·91030, and that the relinquished portion of the old lease is worth 6·190689; whence the difference, 6·719611 years' purchase, multiplied into £350, exhibits the sum of £2351. 17*s.* 3*d.* as the fine to be paid.

Second Example.—The lease of a property rendering £1750 annually, in a single payment, has 12 years unexpired; the renewal is proposed for a term of 99 years, and the rate of interest is agreed to be taken at 4½ *per cent.* as a standard. The Table (*pages* 26th and 28th) exhibits in this case the two values 9·118581 and 21·93760 years' purchase; and the difference 12·819019, multiplied into £1750, produces £22433. 5*s.* 8*d.*, being the value of the renewal.

(LII.) It is now requisite to point out the use of the Tables, in cases where the rate of annual interest (constituting a principal *datum* towards solving the questions that depend on Compound-Interest) may be either lower than *three per centum*, or higher than *six per centum*; being the two limits within which those Tables are circumscribed. The introduction of an example, appropriate to each general case of that description, will be the clearest method of proceeding.

Examples *of application of the Tables, when the Annual Rate of Interest is less than* Three *per centum.*

First: Supposing the rate of 2¾ *per cent.*, in one single and annual payment; be it required the *Improved principal.*

The progress of that improvement will then be, for every succeeding year, the same as for every succeeding half-year when the rate is 5½ *per cent. per ann.*, and accruing by half-yearly instalments. We therefore find in the Table (*page* 42d), that each unit of the original principal will improve, at 2¾ *per cent.*, to 1·7204284 at the expiration of 20 years, and to 3·8823218 at the expiration of 50 years; being respectively the improvements for similar quantities of half-years, when the interest is 5½ *per cent.* And if the interest at 2¾ *per cent. per annum* were to accrue by half-yearly instalments, the progress of improvement would then correspond with the quarterly instalments at 5½ *per cent.*; whence would be found, 1·7267708 and 3·9182011, instead of the above results.

SECONDLY: Supposing the rate of interest 2½ *per cent.* annually, in a single payment; be it required the present value of a future capital.

If we refer to the Table relative to 5 *per cent.* interest; and assimilate each half-year, in the progress of *discounted principal* at that rate, with each full year at the rate of 2½ *per cent.*; we find (p. 35) that each unit of capital forthcoming at the expiration of 25 years, and according to the latter rate, is reducible to 0·5393906, and (p. 37) to 0·1387046 at the expiration of 80 years; those reductions respectively corresponding with the discounts for 12½ and for 40 years, at 5 *per cent.* And if we had to consider the annual rate of 2½ *per cent.* as accruing half-yearly, we then should find the results 0·5373390 and 0·1370234; in consequence of the decreasing progression being the same, for every succeeding half-year at 2½ *per cent.* annually, as for every succeeding quarter at the rate of 5 *per cent.*

THIRDLY: Supposing the rate of interest 2½ *per cent. per ann.* in one single payment; be it required the *Cumulated annuity.*

The results, by the Table corresponding with the annual rate of 4½ *per cent.*, exhibit for every succeeding half-year the progress of accumulation and improvement at Compound-Interest of a portion of annuity equal to 0·5, and therefore referable to each half-yearly instalment; the whole of that annuity being represented by *unity*. But if the annual rate of interest should be admitted at 2½ *per cent.* only, those results would exhibit the similar progress of an annuity no more than 0·5, received and improved during as many full years as the quantity of half-years considered with reference to the double rate of interest; those results, as expressed by the Table, differing however from exactitude inasmuch as they require to be *doubled*, in order to correspond with the integral *unity* of annual income, instead of corresponding as they do with 0·05 only. Hence if it be inquired, (for example,) what amount of capital will be created at the expiration of 30 years, by means of any annual income accumulated and improved from year to year at 2½ *per cent.*, we find (*page* 26th of the Tables) that amount to be in the proportion of 21·097632 times the *half unity* of periodical income during 30 successive half-years, or 15 years as there expressed; from which we conclude 42·195264, or double the preceding quantity, to be the proportion of accumulation when *unity* is taken for the whole yearly income. And if the latter were specifically £1000, it follows that its accumulation and improvement at 2½ *per cent.* annual interest, in one single payment and during 30 years, would produce a capital of £42195·264, or £42195. 5*s.* 3*d.*

Further supposing the same rate of annual interest, 2¼ *per cent.*, but to accrue half-yearly; if it were inquired the cumulated amount, at the expiry of a 54 year's annuity of £600, we should find (*page* 28th) the proportion 52·166864 corresponding with 27 years, by quarterly instalments at 4½ *per cent. per annum*, and corresponding in the same manner with 54 years by half-yearly instalments at 2¼ *per cent.* only; whence the cumulated amount would be £600 multiplied into the double of that proportion, producing therefore £62600. 4*s.* 9*d.*

Fourthly: Supposing the interest at 2¼ *per cent.*, in a single yearly payment; be it inquired the *Redemption-fund* that should annually be supplied, as adequate to the purpose of discharging, at a specific period, the capital of a certain debt.

The considerations are here precisely the reverse of what they were in the preceding case.

We must, in the same manner, resort to the Table (*pages* 23d and 25th) corresponding with a double rate of interest, or that of 4½ *per cent. per annum;* and there look for the series of results relative to half-yearly instalments, in the column entitled *Annuity for Cumulation.* If the period assigned for the redemption should be 21 years, we find 0·0765553 the required proportion referable to 21 half-yearly instalments, or to a period of 10½ years; and if the assignment should be 72 years, we also find the proportion 0·0119896 relative to a period of 36 years, by half-yearly instalments. But as those proportions refer alike, not to *unity*, but to the quantity 2 as the future capital (because of the case converse from the above), we must reduce them to one-half; whence 0·03827765 will be the proportion of the annual redemption-fund for producing any required capital at the expiration of 21 years, and 0·0059948 will be the proportion of that annual fund for creating any capital at the expiration of 72 years. Let that capital be supposed £100,000; the annual redemption-fund will then be, either £3827. 15*s.* 3*d.* during 21 years, or £599. 9*s.* 7*d.* during 72 years.

Supposing again that the annual rate of 2¼ *per cent.* were understood by half-yearly instalments, we should refer in that case to the column of results corresponding with quarterly instalments at 4½ *per cent. per annum*; and proceeding as above, the specific results would respectively be found £3803. 0*s.* 1*d.* and £593. 8*s.*

Fifthly: Supposing the interest at 2 *per cent. per annum*, in a single payment; be it required the value of an annuity for any specific term, and also to accrue by instalments of successively undivided years.

Referring to the Tables (*pages* 18th and 20th), where the value of the annuity is stated with reference to interest at 4 *per cent.*, it is necessary only to observe that half-years are there to be taken as full years, subject to interest at 2 *per cent.* only; that quarters, at the former rate, are likewise to be assimilated to half-years at the latter rate; and that the *Value*, as expressed by the Tables, is consequently to be doubled.

For exemplification, let two cases of annuities be specified, the one for 20 years and accruing annually, the other for 45 years and accruing by half-yearly instalments, both at 2 *per cent. per annum.* The value of the first will be, according to the Table (*page* 18th), twice 13·67774 or 27·35548 years' purchase; and the value of the other (*page* 20th) twice 20·8304, or 41·6608 years' purchase.

Sixthly: Supposing the annual rate of interest 1⅞ *per cent.* in a single payment; be it required the *Ratio of the annuity*, or the proportion which that annuity should bear with its represented principal.

This question being exactly converse of the preceding; refer to the Table corresponding with the double rate of interest, or 3¾ *per cent.*; substitute years for half-years, as also half-years for quarters; and reduce the Ratio to one half of the fractional quantity expressed in that Table. Thus it will be found (*page* 15th) that a 25 years' annuity in a single payment, when interest is at 1⅞ *per cent.*, should be in the proportion 0·03099275, being one-half of 0·0619855, for every *unit* of the represented principal; and (*page* 17th) that a 50 years' annuity, half-yearly instalments, and calculated at the same rate of annual interest, should be constituted in the proportion of 0·0221815, being one half of 0·044363. If the capital to be invested were £10000, the Annuities would therefore be, respectively, £309. 18*s.* 6*d.* and £221. 16*s.* 3*d.*

(LIII.) Examples *of application of the Tables, when the Annual Rate of Interest exceeds* six *per centum.*

First: Supposing the annual rate 6½ *per cent.*, to accrue by half-yearly instalments; be it required the *Improved principal.*

The progress of improvement will be, for every succeeding half-year, the same as for every succeeding year at the rate of 3¼ *per cent.*; consequently, we find in the Table (*page* 6th) that each *unit* of principal improves at the latter rate, and at the expiration of 25 years, into 2·2245978, answering also to 12½ years by half-yearly instalments, when that rate is doubled or 6½ *per centum.* And if the interest at this annual rate were to accrue quarterly, the corresponding improvement for the same term of 12½ years would be 2·2388651, the same as 25 years' improvement at 3¼ *per cent.* interest accruing at each half-year.

Secondly: Supposing the annual rate of interest, at 7 *per cent.*, to accrue half-yearly; be it inquired the present value of future capital.

The considerations in this case being converse of the above, and reverting to the Table that corresponds with 3½ *per cent.* annual interest, we find (*page* 13th) that every *unit* of capital forthcoming at the expiration of 30 years is reducible to 0·3562784, by *discount* at the latter rate in a single payment; which same result is produced by the discount of 30 half-yearly instalments comprised in a term of 15 years only, when the interest is doubled or rated at 7 *per cent. per annum.* Quarterly instalments, at this last rate, will equally answer to half-yearly instalments at 3½ *per cent.* annual interest.

Thirdly: Supposing 7½ *per cent.* interest *per annum*, and subject to half-yearly instalments; be it inquired the *Cumulated annuity.*

This being converse of the 3d case exposed in *page* 72d, every consideration there set forth accordingly applies in the present; and it may be sufficient, in addition, to state a specific instance of that application.

If an annuity of £500 and paid by half-yearly instalments, when the interest is at 7½ *per cent. per annum* and accruing half-yearly also, be accumulated and improved during 20 years at that rate of Compound Interest; it will create, at the expiration of such period, a similar capital to that which would be produced by the accumulation and improvement at an interest of 3¾ *per cent.* only, in undivided yearly payments, of an annuity equal to no more than half of the first, or to £250, but extended to 40 years' duration. Therefore, as we find in the Table (*page* 16th, *column* 2d) that every *unit* of the annuity will at the expiration of this last period have created 89·6101 capital, the conclusion is, that the capital created at the expiration of the prescribed term of 20 years will be £250 multiplied into 44·80505, being one half of the former quantity indicated by the Table; producing in either way £22402. 10*s.*

If again a £500 annuity were to accrue by quarterly instalments, during the period of 20 years, that annuity would assimilate with another of £250 only and paid half-yearly during 40 years; when by the same Table (*page* 16th *column* 5th) we find that every unit of such income would create capital in the proportion of 91·1966; therefore the whole annuity a capital of £22799. 3*s.*, or £500 multiplied into half that proportion.

Fourthly: Supposing 8 *per cent.* annual interest, by half-yearly instalments; be it inquired the periodical *Redemption-fund.*

This is the counterpart of the 4th example of the preceding series (*page* 73d), the reasoning on which occasion equally applies here.

If the question should be of the savings required out of any income, at the expiration of each succeeding half-year, and until the 25th year accomplished, with a view then to redeem £100,000 of debt, by means of the accumulation and improvement of those savings at the above-mentioned rate of compound interest; it is evident that they must be the same as would be required at the expiration of each succeeding year until the 50th accomplished, upon a supposition of the improvement taking place at only one-half that rate of annual interest, or at 4 *per centum*. Hence the table (*page* 21st, *column* 2d,) informs us that the proportion of savings, either annually in the latter supposition, or half-yearly in the supposition of 8 *per cent.* interest,—and for every *unit* of the required capital,—is 0·0065502; consequently £655·02 will be the half-yearly, or £1310·04 (say £1310. 0*s.* 5*d.*) the annual redemption-fund. And if required by quarterly instalments, it would be in the proportion of 0·0064055 for every *unit*, corresponding with half-yearly instalments at 4 *per cent. per annum*; therefore £320. 5*s.* 6*d.* the quarterly, £640. 11*s.* the half-yearly, and £1281. 2*s.* the annual redemption-fund, during 25 years.

Fifthly: Supposing the annual interest 8½ *per cent.*, with the condition of its accruing half-yearly; be it inquired the *Value of the annuity*.

If we further suppose that annuity to be of 17½ years' duration, and also paid by half-yearly instalments, its value will be the same as that of another annuity of half the sum, but payable at the expiration of each succeeding year during double that time, or until the 35th year accomplished, on the supposition of 4¼ *per cent.* interest only. The table (*page* 24th, *column* 3d) indicates the latter annuity to be valuable at 18·04729 years' purchase; whence the former, being for 35 half-years, or 17½ years only, will be valuable at exactly one-half, or at 9·023645; and if by quarterly instalments, the rate of interest understood to accrue in the same manner, the value will be 9·064875 years' purchase, or one-half of 18·12975, corresponding with half-yearly instalments of the interest rated also at 4¼ *per cent. per ann.*, as indicated in the same table (*column* 6th).

Sixthly: Supposing the annual rate of interest 9 *per cent.*, to accrue half-yearly; be it inquired the *Ratio of the annuity*, or the proportion that any annuity should bear with the invested capital.

The present question being converse of the preceding, if we further suppose the implied annuity to endure for a term of 25 years, and to accrue by 50 half-yearly instalments, it will correspond with another annuity equal to one-half only of the first, but extended to 50 full years' duration, and accruing by undivided annual payments, upon the supposition of an annual rate of interest no more than 4½ *per cent.* and accruing in the same manner. We then find, according to the Table (*page* 29th, *column* 3d), that the latter annuity should be constituted in the ratio of 0·0506021 for every *unit* of the invested capital, whence the former in the ratio of 0·1012042; and therefore, admitting £10,000 capital, the annuity of 25 years' duration should be £1012. 0*s.* 11*d.*, calculating from 9 *per cent.* rate of interest. Quarterly instalments would, according to the same table (*page* 29th, *column* 6th), reduce the ratio to 0·109038, being the double of 0·0504519, ratio corresponding with 4½ *per cent.* interest *per annum*, by half-yearly instalments.

(LIV.) When the annuity, or income whatever, set apart for creating by its accumulation any capital at a future period, accrues at shorter intervals of instalment than those at which the improvement by compound interest at any given rate is obtainable; or when, on the contrary, the income or annuity accrues by instalments more distant than those available for the improvement; the question concerning the progression of such accumulation and improvement, as also the question concerning the value of the annuity, become complicated. In both cases, and for solving each of those questions, it is necessary to revert to the primary equations stated in *Sections* IXth and XIIIth, where is generally established $m = \frac{a(1+r)^n - a}{r}$, as also $p = \frac{a(1+r)^n - a}{r(1+r)^n}$; and then to proceed by analogy, as follows.

The question being of the *Cumulated annuity*, and supposing the instalments of such annuity to be shorter than those that apply to the rate of interest; if we then signify by $4a$ the whole annuity, by a each of its quarterly instalments, by n the forthcoming quantity of those instalments, and by r the half-yearly ratio of interest, we obviously find the cumulated amount m composed of these two series of progressive quantities:—

$$m = a + a(1+r) + a(1+r)^2 + a(1+r)^3 + a(1+r)^4 + \&c. \ldots\ldots \text{to } a(1+r)^{\frac{n-2}{2}} +$$

$$+ a(1+\tfrac{r}{2}) + a(1+\tfrac{r}{2}).(1+r) + a(1+\tfrac{r}{2}).(1+r)^2 + a(1+\tfrac{r}{2}).(1+r)^3 + \&c. \text{ to}$$

$$a(1+\tfrac{r}{2}).(1+r)^{\frac{n-2}{2}}; \text{ whence } m = \frac{a(1+r)^{\frac{n}{2}} - a + (1+\frac{r}{2}).(1+r)^{\frac{n}{2}} - a(1+\frac{r}{2})}{r}$$

$$= \frac{\left[a + a(1+\frac{r}{2})\right] \times \left[(a+r)^{\frac{n}{2}} - 1\right]}{r}.$$

In order to exemplify this solution, if we suppose the annuity £100, by quarterly instalments of £25 each, the term 16 years or 64 quarters, and the half-yearly rate of interest 2 *per cent.*, or ratio 0·02; the latter equation, reduced to numerical quantities, will then be $m = \frac{50·25(0·8845406)}{0·02} = 2222·4082$, or £2222. 8*s*. the Cumulated amount. Each unit of the annuity having therefore created 22·224082 capital at the expiration of 16 years, we find by the table (*page* 18th), that if the instalments of that annuity had been half-yearly, the capital produced would have been only 22·113515, and that it would have been 22·261547 on the different supposition, of quarterly instalments applied both to the annuity and to the rate of interest.

Further supposing (as another example) an annuity of £1, its term extended to 100 years or 400 quarterly instalments, and the same ratio of interest as above to govern the calculation, we obtain . . . .

$$m = \frac{50·25\,[(1·02)^{200} - 1]}{0·02} = \frac{50·25 \times 51·484899}{0·02} = £\,1293·5581;$$ being

the Cumulated amount, comparable with 1287·1225, if the instalments of that annuity were half-yearly, and with 1313·1029 if the instalments of interest were quarterly, as appears by the same table (*p.* 20th).

Under the same supposition of shorter instalments of the annuity, and following by analogy we have, in consequence, of $p = \frac{m}{(1+r)^{\frac{n}{2}}}$, the value of such annuity generally expressed by $p = \frac{\left[a + a(1+\frac{r}{2})\right] \times \left[(1+r)^{\frac{n}{2}} - 1\right]}{r\,(1+r)^{\frac{n}{2}}}$; whence, by admitting the above two cases of annuities as examples of application, and further admitting $4a = 1$, in order that the results may refer to *unity* of the annual income, we obtain in case of the annuity limited to 16 years, $p = \frac{22·224082}{1·8845406} = 11·79284$, and in case of that annuity extended to 100 years $p = \frac{1293·5581}{52·484899} = 24·64630$; being the respective values, comparable the former with 11·73417 and 11·77572, and the latter with 24·52367 and 24·53292, results found in the same table and according as the instalments may be taken, either half-yearly or quarterly. And be it observed that this excess of value, in both cases, does not proceed from any error; but is the natural consequence of any present capital, improvable by half-yearly instalments, being relatively less valuable than the same capital susceptible of quarterly improvement.

Should on the contrary the annuity, or any other income, accrue by instalments more distant than those available for the improvement at compound interest, we have then, and by similar analogy with the primary equations,—

$$m = a + a(1+r)^2 + a(1+r)^4 + a(1+r)^6 + \&\text{c. to } a(1+r)^{n-2} = \frac{a(1+r)^n - a}{(1+r)^2 - 1},$$

$$\text{and } p = \frac{a(1+r)^n - a}{[(1+r)^2 - 1] \times (1+r)^n}.$$

To exemplify in a particularized case, let it be supposed £1 annuity, receivable at the expiration of the year now commencing and of every succeeding year, to the 25th inclusive; the rate of interest, considered in the improvement, being nominally 4 *per cent. per annum*, but accruing by half-yearly instalments; whence $r = 0{\cdot}02$, and $n = 50$; we shall then have ....

$$m = \frac{a(1+r)^n - a}{(1+r)^2 - 1} = \frac{1{\cdot}691588}{0{\cdot}0404} = 41{\cdot}87099, \text{ or £41. 17s. 5d., being the}$$

amount of that annuity accumulated and improved at compound interest until the period of its expiration, which amount is comparable with 41·645908 and with 42·289701, as indicated by the table (*page* 18th); and . . . . . .

$$p = \frac{a(1+r)^n - a}{[(1+r)^2 - 1] \times (1+r)^n} = \frac{41{\cdot}87099}{2{\cdot}691588} = 15{\cdot}55624 \text{ years' purchase, as}$$

its present value, comparable also with 15·62208 and with 15·71180, the values expressed in the same table.

If we further suppose the same annuity extended to 100 years, the results of calculation will be $m = \frac{51{\cdot}484899}{0{\cdot}0404} = 1274{\cdot}3787$, the Cumulated annuity, and $p = \frac{1274{\cdot}3787}{52{\cdot}484899} = 24{\cdot}2808$ the Value of such annuity; the former of which results is comparable with 1237·6237 and with 1287·1225,—the latter with 24·505 and with 24.52367, as expressed by the same table (*page* 20th). And again it is to be observed, that this apparent deficiency of value is the consequence of a capital, improvable half-yearly, being relatively worth more than the same capital improvable only by annual instalments.

(LV.) When a Stock originally funded by perpetual annuity, at a higher interest than the current rate at the present time, is redeemable at the debtor's pleasure, that stock, notwithstanding its superior nominal rate of interest, can possess no greater value than another perpetual stock funded at the present rate of interest; except in consequence of assuming, either that the latter rate is not entitled to consideration as a permanent one, or else that the faculty of redemption will continue during more or less time without being acted upon.

But if any stock funded on the principle of perpetuity should, from the conditions of the contract, be irredeemable until some assigned and future period, it will, under circumstances similar to the above in other respects, possess a marketable value superior to *par*; and the exact value, to which it is entitled, may then be accurately ascertained. To this effect, let it be considered that any Stock of that description is compounded of two parts, having each its proper value; *first*, that of a terminable annuity, to continue at its original and superior ratio until the period available for the redemption of that annuity at par, and *secondly* the value of a perpetual annuity constituted according to the present reduced rate of interest, but from which last value should be subtracted that of a terminable annuity, at the same reduced rate, and supposed to endure until the assigned period of redemption. A single example of the solution of this question, by means of the tables, will be sufficient.

Suppose a Stock funded at 5 *per cent. per annum*, by half-yearly instalments, the last of which had just fallen due, such stock to continue irredeemable until the expiration of 7 years from the present time; and that another stock funded at 3½ *per cent.*, accruing also by half-yearly instalments, being at *par*, it were inquired the present value of the former, relatively to that of the latter stock.

From the value of the perpetual stock, stated at par	100
subtract the value of an annuity at 3½ *per cent.*, supposed to endure for 7 years only, or 14 half-yearly instalments, and which by the table (*page* 10th) is 6·161002 years' purchase; this last quantity multiplied into 3½ is	21·56351
remains....	78·43649
and adding the value of an annuity at 5 *per cent.* for the same term of 7 years, which is equal to 5 multiplied into the same quantity 6·161002	30·80501
together....	109·24150

or very near 109¼; which is the value of every 100 of stock at 5 *per cent.*, but irredeemable during the next seven years.

The same result is to be obtained by merely adding to 100, or to the price of stock at *par*, the difference 1½ of the two rates, multiplied into 6·161002; which last is the quantity of years' purchase at which an annuity limited to 7 years should be valued, when interest is at 3½ *per cent.* and the instalments half-yearly.

(LVI.) The preceding question leads us to consider also that of the value of *deferred annuities;* which of their description may be either *perpetual* or *terminable.*

The value of a deferred annuity, in both cases, is that of an equal annuity commencing to run from the present time, *minus* the discounted value of the instalments withheld.

Supposing a perpetual annuity constituted at 4 *per cent.*, and the term of which should not commence to run until the expiration of 10 years from the present time, its first half-yearly instalment consequently falling due six months afterwards; be it inquired the present value of that deferred annuity, admitting the same standard rate of interest, 4 *per cent. per annum*, also to accrue half-yearly. The table *(page* 18th) indicates 8·175717 years' purchase, as the value of the 20 instalments withheld and comprised in the suspensive term of 10 years, which quantity subtracted from 25, the value of perpetuity, leaves for the required value 16·824283 years' purchase; and as the ratio of that annuity is 4 *per cent.*, the value of £100 stock of that description will be £4 multiplied into 16·824283, or £67. 6*s.* The capital represented by annuities that are altogether deferred and terminable will, on the same principle, be ascertained by the difference between the present values of the long and of the short term; which position does not require any specific exemplification.

We may further suppose, however, the case of a perpetual and deferred annuity such as the above, but constituted at some earlier period with the condition of its continuing irredeemable during the first 20 years, or until the expiration of 30 years from this time; and that the rate of interest, at present available, were reduced to 3¼ *per cent. per annum*, also half-yearly instalments. Admitting this rate of interest as a permanent standard, and applying the rules already set forth, we proceed in the following manner to ascertain the value of each £100 stock funded as here mentioned.

From the present value of a 3¼ *per cent.* stock, being at *par*....	£ 100.
subtract the value of the first 30 years of an annuity in that ratio, which by the Table *(page* 8th) is 19·07200 years' purchase, and multiplied into £ 3¼, is	61·98400
Remains the present value of a perpetuity after 30 years	£ 38·01600
Add to this, the difference between the value of a 30 years' annuity and that of a 10 years' annuity, both of £4; or between 19·07200 and 8·47947, according to the Table *(pages* 6th and 8th), that difference being £4 multiplied into 10·59253 years' purchase, or..	42·37012
Together........	£ 80·38612

the value of £100 stock, or about 80⅜ *per centum.*

From those examples it will be easily perceived how to operate in all analogous cases.

(LVII.) British capital being frequently invested in the securities of foreign governments, and at very elevated rates of interest comparatively with the rates afforded by investments at home,—such surplus interest compensated however by an additional risk incurred and depending on political considerations,—it may be desirable to ascertain the period at which that additional risk is likely to terminate; considering that the capital originally put to hazard is gradually recoverable, by means of periodical savings out of the income, and of their improvement during that period. The simple question, thus stated, is easily solved by the Tables.

Supposing the annual interest at home to be 3½ *per cent.*, assumed as a permanent rate, subject to half-yearly instalments, and that a loan were granted to a foreign government at 5 *per cent. per annum*, payable in the same manner; the extraordinary risk will be extinct whenever the saving of 1¾, annual surplus has, by accumulation and improvement at the rate of 3½ *per cent.* compound interest, recomposed the original capital £100; although the ordinary income, at that rate, will have been available in the meantime. This being the period at which *unity* of income will, in a corresponding proportion, have produced £57·142857 capital, it is immediately ascertained, by the Table (*page* 8th), to be a period of 32½ years or thereabouts. Therefore, if the probable consequence of a war with that foreign country should happen to be the confiscation of its enemy's tangible property, such a transaction could scarcely be considered as prudent, unless the balance of chances were in favour of uninterrupted peace during 32½ years at least.

But instead of allowing the risk of foreign contingencies to diminish from each half year to the next, in consequence of exempting from that risk the reinvestment of the savings; if such reinvestment were also made abroad and there improved at 5 *per cent. per annum* compound interest, assumed to be a permanent rate, the Table (*page* 36th, *column* 5th) indicates that 27½ years, or thereabouts, will then be sufficient for recomposing the capital integrally exposed to extraordinary risk until the accomplishment of that period. The Cumulated annuity being 55·878498 for 27 years, and 59·719847 for 28 years, those quantities respectively multiplied into 1¾ (the annual surplus) produce 97·787372 and 104·509733, capital at the end of those terms.

Let any foreign investment be further supposed at 7½ *per cent.* annual interest, accruing half-yearly, therefore in the proportion of 3¾ *per cent.* at each instalment; and the whole of that income to be successively reinvested at the same rate. The Table (*page* 14th) shews that in such case, and after 19 instalments embracing a period of 9½ years only, every unit of that half-yearly income will have grown, by accumulation and improvement, to a capital of 27·00471; whence 3¼ to 101·26766, or even exceeding in the proportion of 1·26766 to 100 the original capital at stake. The accurate solution, however, is indicated by the 6th case amongst those enumerated in *Section* XVth, where the term of the annuity is generally expressed by $n = \frac{\log.(a-mr)-\log.a}{\log.(1+r)}$; . . . . .

which numerically constructed, gives $n = \frac{\log.(0·0375+0·0375)-\log.(0·0375)}{\log.(1·0375)}$;

$= \frac{\log.2}{\log.(1·0375)} = \frac{0·301029995664}{0·01598811} = 18·82827$, the quantity of half-yearly instalments required.

And lastly, let us suppose a question of the more extensive period at which the same annuity would, in consequence of a similar accumulation and improvement, repay the original capital, together with its increase by compound interes rated only at 3¼ *per cent. per annum;* still admitting half-yearly instalments of both rates.

It is perceived, by the table (*page* 16th), that *unity* improved during 33 years, at 3¾ *per cent.* in entire annual payments, produces 3·3698260, and 3·4961945 if thus improved during 34 years; which quantities, respectively taken in the proportion of one half, are reducible to 1·6849130, corresponding with 33 half-yearly instalments, and to 1·7480972 corresponding with 34 similar instalments, admitting the interest at 7½ *per cent. per annum,*—difference 0·0631842 for the last half-year's improvement; and it is also perceived, that when the annual interest is rated at 3¼ *per cent.* by half-yearly instalments, *unity* should improve to 1·6750118 at the expiration of 16 years, and to 1·7298920 at the expiration of 17 years; difference 0·0548802 for the whole 17th year's improvement. Now, ¼ of this difference subtracted from the preceding quantity leaves 1·716172, for 16¾ years' improvement; whilst subtracting one half of the former difference from 1·7480972 there is left 1·7165051 for the improvement during the same term, or 33 half-years, when the annual interest is rated at 7½ *per centum.* The coincidence of those results shews that the required period is 16¼ years, according to the nearest approximation attainable by this circuitous method; and it is obvious that the original capital will then be reimbursed, together with constant interest at the minor rate.

But the direct calculation yields a more accurate solution of this question, which partly falls within the 3d general case (*Section* XVth); the Cumulated amount of the annuity being there expressed by $m = \frac{[(1+r)^n-1]\times a}{r}$.

It has already been ascertained, by the solution of the preceding question, that at a period $n = 18{\cdot}82827$ half-years the original capital would barely be repaid; and there remains to ascertain an additional period n' sufficient for producing, by the accumulation and improvement of a half-yearly income of 0·0375 in this same ratio of compound interest, a quantity equal to the accumulation and improvement of a half-yearly income of 0·01625 only, during a period $n+n'$.

Therefore we have, on one part, $m = \frac{[(1{\cdot}0375)^{n'}-1] \times (0{\cdot}0375)}{0{\cdot}0375}$, and on the other part, $m = \frac{[(1{\cdot}01625)^{n+n'}-1] \times (0{\cdot}01625)}{0{\cdot}01625}$; which, as $a = r$ in each of those equations, and as m is an identical quantity in both, is simplified into $(1{\cdot}0375)^{n'} = (1{\cdot}01625)^{n+n'}$, or $(1{\cdot}0375)^{n'} = (1{\cdot}01625)^{n'+18{\cdot}82827}$; whence is successively deduced, $(n'+18{\cdot}82827) \times \log. (1{\cdot}01625) = n' \times \log. (1{\cdot}0375)$,

$18{\cdot}82827 \times 0{\cdot}00700056 + n' \times 0{\cdot}00700056 = n' \times 0{\cdot}01598811, \quad . \ . \ :$

$n(0{\cdot}01598811 - 0{\cdot}00700056) = 18{\cdot}82827 \times 0{\cdot}00700056, \quad . \ . \ . \ . \ . \ .$

and ultimately $n' = \frac{18{\cdot}82827 \times 0{\cdot}00700056}{0{\cdot}00898755} = 14{\cdot}66575$.

Adding this last quantity to 18·82827, we have $n + n' = 33{\cdot}49412$, a period very near 33½ half-years or 16¾ years, at the expiration of which the whole capital risked in the foreign loan would be repaid, together with compound interest at 3¼ *per cent. per annum*; and beyond that period, all further income derived from the transaction would be a clear profit.

(LVIII.) In case of any series of equal sums, payable at equidistant instalments, the quantity of which expressed by n, if it were required to ascertain the intervening period when the united amount of those sums might be discharged in a single payment, without injury either to the debtor or to the creditor; having ascertained the present value of those sums, respectively discounted and considered as a terminable annuity, the period at which that present value would, if improved at compound interest, amount to the same total sum as before the discount, must be the period required.

Example.—A portion of the National Debt of this country consists in certain terminable annuities, to the amount of £1,338,837, the last half-yearly instalment of which will become due the 5th of January 1860; and after discharging the instalment due on the 5th of January 1825, it is inquired the period at which the total sum of £46,859,295, being the unreduced amount of the 70 instalments then forthcoming, might equitably be discharged in one single payment; calculating on 3½ *per cent.*, as a standard rate of annual interest, but supposed also to accrue in half-yearly proportions.

The table (*page* 8th) immediately solves this question. It is there stated that a 35 years' annuity, accruing by half-yearly instalments, is exactly worth 20·8134 years' purchase; and as the improvement of this last quantity at compound interest, into the original quantity 35, is in the proportion of *unity* to 1·681609, the same table (*page* 6th) further indicates that such improvement should take place between the 16th and the 17th year. At the expiration of 16 years it will be 1·6750118, and at that of 17 years 1·7298920,—difference 0·0548802 for the 17th year; and as the required improvement exceeds that for 16 years by a quantity only 0·0065972, we find by taking the proportion of those differences that the latter corresponds with 44 days; whence follows, that the payment of the whole sum £46,859,295 might equitably be effected at the expiration of 16 years and 44 days after the 5th of January 1825, or on the 18th February of the year 1841.

Under the supposition of deferred annuities as already described (LVI.), the present value of the withheld instalments should first be subtracted from that of the complete annuity; proceeding afterwards as above directed, to ascertain the period (computed from the present time) at which such discounted value is improvable into the original and total sum.

But it might be proposed to discharge such a debt as the *Long-annuities* by the payment of any other specific sum, whether more or less than the unreduced amount of their forthcoming instalments. Let it then be inquired the respective periods at which either the sum of 40 *millions*, or that of 50 *millions*, should be paid for the discharge of those annuities. Having ascertained their present value at 20·8134 years' purchase, if the latter quantity be multiplied into £1,338,837, that value will be £27,865,750; the required improvement of which sum into that of £40,000,000 is in the proportion of 1·4354539 for every unit, and into £50,000,000 is in the proportion of 1·7943174 for every unit also contained in the expression of the present value. The table (*page* 6th) then indicates that the sum of 40 *millions* should be paid at the expiration of about 11¼ years, or else that of 50 *millions* at the expiration of a little more than 18 years, as a fair equivalent. The method of proceeding, by direct calculation, to obtain results strictly accurate, have already been sufficiently explained.

If we further suppose a specific period assigned for the discharge, by any sum once paid, of an annuity whatsoever; it is easily perceivable that such sum must, in all cases, be that into which the value of the annuity is susceptible of being improved at compound interest, from the present time to the assigned period; and the Tables will readily answer all questions of this description.

(LIX.) When the sum to which any original and unknown capital has improved by compound interest, in a ratio also unknown, may be stated with reference to any two periods of that improvement, those data are sufficient for ascertaining both the original principal and the rate of interest.

According to the first case of the series set forth in *Section* XVth, the statement of this question supplies two similar equations, $m = p\ (1+r)^n$, and $M = p\ (1+r)^N$; admitting m as the improvement of the principal p during the period n, and M as its improvement during the period N. From those equations is deduced, $\log.\ (1+r) = \frac{\log.\ M - \log.\ p}{N} = \frac{\log.\ m - \log.\ p}{n}$ whence $\log.\ p = \frac{N \log.\ m - n \log.\ M}{N - n}$; and this last, being resolved, will in consequence of substituting for p its value in the preceding equation determine also the quantity r, or the ratio of interest.

Example.—A principal laid out at compound interest has, at the expiration of 24 instalments, improved to a sum of £2484. 12*s*. 6*d*., and at the expiration of 50 instalments it has further improved to a sum of £4292. 6*s*. 11*d*.: query that principal, and the ratio of its improvements.

Reducing *shillings* and *pence* to *decimal* fractions of *one pound*, we have

$$\log.\ p = \frac{N \log.\ m - n \log.\ M}{N - n} = \frac{50 \times \log.\ 2484{\cdot}625 - 24 \times \log.\ 4292{\cdot}346}{50 - 24} =$$

$$\frac{50\ (3{\cdot}3952609) - 24\ (3{\cdot}6326947)}{26} = \frac{169{\cdot}763045 - 87{\cdot}184673}{26} = 3{\cdot}1760912,$$

which last quantity is the logarithm corresponding with £1500, the original principal inquired after.

We have next, $\log.\ (1+r) = \frac{\log.\ m - \log.\ p}{n} = \frac{3{\cdot}3952609 - 3{\cdot}1760912}{24}$

$= 0{\cdot}00913207$, being the logarithm of 1·02125; whence the ratio is 0·02125, or 2⅛ *per cent.*, rate of interest corresponding with each instalment, which, if understood half-yearly, would establish the annual rate at 4¼ *per cent.* It might indifferently have been proceeded with *log.* $(1+r) = \frac{\log. M - \log. p}{N}$, yielding the same result.

(LX.) Any principal sum being specified, with its increase by compound interest at the expiration of a given period, the corresponding increase either of the same or of any other principal, at the expiration of a period different from the first,—and also the rate of interest supposed to be unknown,—may both be deduced from those data; admitting uniformity in that unknown rate of interest.

Example, in which the principal is considered different in the two clauses of the statement.

A capital of £2000 $= p$ has increased to £10641. 18*s*. 9*d*. $= m$, by improvement at compound interest until the accomplishment of 168 $= n$ instalments; it is then inquired, *first* the corresponding improvement of £3550 $= P$ at the expiration of 100 $= N$ similar instalments, the ratio of interest being the same in both cases; and *secondly*, what is that ratio r of interest appertaining to each instalment.

Solution.—Admitting M as the improved principal required, we have (in common with the preceding question) these two equations, $m = p\,(1+r)^n$, and

$M = P\,(1+r)^N$; whence, log. $M = \frac{N\,(\log. m - \log. p) + n \log. P}{n}$

$= \frac{100\,(\log. 10641{\cdot}9375 - \log. 2000) + 168\,(\log. 3550)}{168}$; therefore $M =$

$\frac{100 \times 0{\cdot}7259907 + 168 \times 3{\cdot}5502284}{168} = 3{\cdot}9823667$, which quantity is

the logarithm of 9602·1 or of £9602. 2*s*., the sum proceeding from the improvement of £3550 original capital, at the expiration of the 100th instalment.

The same equations being further transformable into . . . .

log. $(1+r) = \frac{\log. M - \log. P}{N}$, and into log. $(1+r) = \frac{\log. m - \log. p}{n}$,

we may indifferently take log. $(1+r) = \frac{3{\cdot}9823667 - 3{\cdot}5502284}{100}$, or

log. $(1+r) = \frac{4{\cdot}0270207 - 3{\cdot}3010300}{168}$, either of which yields the result

0·00432137, logarithm corresponding with 1·01 $= 1 + r$, whence the ratio $r = 0·01$; and if the instalments were understood as quarterly, the annual ratio would be 0·04, or the rate of interest 4 *per cent.*

The solution would be obtainable by the same method, if the two original capitals differed not from each other; in which case, we should have . . .

$$\log. M = \frac{N(\log. m - \log. p) + n \log. p}{n}.$$

(LXI.) When it is stated that a certain principal has improved at compound interest to a certain sum at the expiration of a certain period, although the ratio of such improvement be unknown, those data are sufficient for ascertaining the period at which the same or any other principal would improve to any specific amount, provided that the same unknown ratio of interest be understood in both instances.

In the present question there are two results, either $N = \frac{n(\log. M - \log. p)}{\log. m - \log. p}$ when the two principals are alike, or $N = \frac{n(\log. M - \log. P)}{\log. m - \log. p}$ when they differ from each other, those results immediately deduced from the equations above stated; and in the following exemplification, the latter supposition is proceeded upon.

Example. A capital of £2750 has produced another of £4950. 8*s.* 7½*d.*, by improvement at compound interest until the expiration of a 63d instalment; and it is inquired the period at which an original capital of £10,000 would be improvable to £64,641. 2*s.* 2½*d.*, at the same rate of interest, which is kept out of view.

Solution. $N = \frac{63(\log. 64641·1104 - \log. 10000)}{\log. 4950·4312 - \log. 2750} = \frac{63(4·8105088 - 4)}{3·6946430 - 3·4393327}$

$= 200$, the period of instalments required. And the ratio of interest, corresponding with each of those instalments, will be found as in the preceding question; having $\log. (1+r) = \frac{\log. 64641·1104 - \log. 10000}{200} = \frac{0·8105088}{200}$

$= 0·004052544$, which is the logarithm of 1·009375, therefore $r = 0·009375$; and if the instalments were understood *quarterly*, the annual ratio would be $4 \times 0·009375 = 0·0375$, or 3¾ *per cent.* the rate of interest.

(LXII.) Embracing in a general view the series of questions that depend on the consideration of deferred annuities, we find their solution in the transformations of which one single fundamental equation is susceptible.

Thus, let p, a, and r, retain the significations respectively assigned to them in the foregoing pages; let t signify the period during which the annuity is to remain suspended, and n the subsequent period of its actual payment; the present value of that annuity will then be expressed by . . . .

$$p = \frac{a}{(1+r)^{t+1}} + \frac{a}{(1+r)^{t+2}} + \frac{a}{(1+r)^{t+3}} + \text{\&c. to } \frac{a}{(1+r)^{t+n}} = \frac{a(1+r)^n - a}{r(1+r)^{t+n}};$$

in consequence of which, any four of the five quantities p, a, t, n, and r, being given, the remaining one may be deduced from those data, and the following five equations respectively solve the different questions.

$$p = \frac{a[(1+r)^n - 1]}{r(1+r)^n.(1+r)^t};$$

$$a = \frac{pr(1+r)^n.(1+r)^t}{(1+r)^n - 1};$$

$$t = \frac{\log.(1+r)^n + \log. a - \log.[(1+r)^n - 1] - \log.(pr)}{\log.(1+r)};$$

$$n = \frac{\log.\left[1 - \frac{pr(1+r)^t}{a}\right]}{-\log.(1-r)}.$$

Lastly, after admitting $b = \frac{2t+n+1}{2}$, $c = \frac{12\,b}{n^2-1}$, $d = \left(\frac{an}{p}\right)^{\frac{1}{b}}$, $e = c - 2(d-1)$,

we find $r = n - \sqrt{(ec)}$, by analogy with the 9th case of *Section* XVth, and demonstrable in the same manner.

(LXIII.) If we suppose any principal p originally due, and subject to interest in the ratio r; which debt, in consequence of the interest remaining unpaid until the expiration of a period n, had increased by compound interest to a total m, then proposed to be converted into a perpetual annuity a; those five quantities, p, r, n, m, and a, will in all cases answering to the above description be invariably related according to the following general expressions, obtained by mutual transformation:—

$$a = rp(1+r)^n = rm;$$

$$m = p(1+r)^n = \frac{a}{r};$$

$$n = \frac{\log. m - \log. p}{\log. (1+r)} = \frac{\log. a - \log. p - \log. r}{\log. (1+r)};$$

$$p = \frac{a}{r(1+r)^n} = \frac{m}{(1+r)^n};$$

$$r = \frac{a}{m} = \frac{a}{p(1+r)^n}; \text{ or } \log. (1+r) = \frac{\log. m - \log. p}{n}.$$

The first *four* of those questions are solvable without any difficulty; but as regards the latter, it is to be observed that the quantity r cannot become the subject of the question, except in the case of m being also unknown, thus rendering that question very complicated. It then admits an approximate solution by the following method, for which we are indebted to Sir Isaac Newton:—

Take $\frac{a}{p} = r'$, and $r = r' + z$; substitute these in the equation $r(1+r)^n = \frac{a}{p}$, which produces $(r'+z).[1+(r'+z)^n] = r'$; and discarding, in the development of the binominal quantity, all the terms affected with z^2, z^3, &c., there will be $z = \frac{r' - r'(1+r')}{(1+r')^{n-1} \times (1+r'+nr')}$, and $r = r' + z = \frac{r' + nr' \times r'(1+r')^{n-1}}{(1+r')^{n-1} \times (1+r'+nr')}$. Let the latter quantity be expressed by r'' and again substituted in $r = r'' + z$, which gives $r = \frac{r' + nr'' \times r''(1+r'')^{n-1}}{(1+r'')^{n-1} \times (1+r''+nr'')}$; and signifying this last by r''', there will ultimately be obtained $r = \frac{r' + nr''' \times r'''(1+r''')^{n-1}}{(1+r'')^{n-1} \times (1+r'''+nr''')}$.

By further continuing the same process, the value of r may be obtained by approximation in any required degree.

(LXIV.) Suppose p the principal of a debt, with r the ratio of its interest; and that instead of pr, or the amount of such interest corresponding with each instalment, being regularly paid, the debtor should pay each time, and during a period n of instalments, any other sum a, whether greater or less than pr. If by m be signified the balance remaining due at the expiration of that period, under the consideration of compound interest; by m' the sum to which the debt would have increased, in case that the debtor had not paid any thing; and by m''

the amount of the periodical sums a, accumulated and improved at compound interest in the same ratio r; we shall then have $m = m' - m''$, $m' = p(1+r)^n$, and $m'' = \frac{a(1+r)^n - a}{r}$; whence $m = p(1+r)^n - \left[\frac{a(1+r)^n - a}{r}\right]$.

Consequently, any four of the five quantities m, p, a, n and r, being given, the remaining one may also be ascertained as follows:

$$m = p(1+r)^n - a\left[\frac{(1+r)^n - 1}{r}\right],$$

$$p = \frac{mr + a(1+r)^n - a)}{r(1+r)^n},$$

$$a = \frac{r[p(1+r)^n - m]}{(1+r)^n - 1},$$

$$n = \frac{\log.\ (mr-a) - \log.\ (pr-a)}{\log.\ (1+r)},$$

$$r = \frac{a(1+r)^n - a}{p(1+r)^n - m}.$$

But this last can only be solved by approximation, and in the manner pointed out in the preceding section.

If the sum a, paid by the debtor at each instalment, were such as ultimately to produce $m = o$; by which is meant, that the original debt should be exactly cancelled at the expiration of the term n; the case would then fall within the series of positions stated in *Section* XVth.

Again, let us suppose that instead of the debtor paying any sum a at each instalment, he received that sum additionally from his creditor, the five questions then susceptible of arising would be solvable according to the equations above stated; with this difference only, that a should be made a *negative* instead of a *positive* quantity; substituting + for −, and − for +, in all those terms which are affected with it.

END OF THE FIRST PART.

THE

DOCTRINE

OF

COMPOUND INTEREST.

Part Second;

IN WHICH THAT DOCTRINE IS APPLIED TO LIFE-ANNUITIES, AND TO OTHER TRANSACTIONS AFFECTED WITH CONTINGENCY.

(I.) ANNUITIES on single or on joint lives; Life assurances; Reversionary payments, by annuity or otherwise; Expectations depending on survivorship; Endowments for children, for widows, or for persons in old age; with other prospective transactions, equally founded upon the operation of Compound-interest combined with the chances affecting the duration of human life, collectively form a copious subject, already enlarged upon by able writers of this and of other countries. The intention, here, is therefore to treat that subject with great brevity; merely stating the general principles on which it rests, with so much of their application as will be sufficient for establishing the basis of calculations relative to the transactions above described; and superadding a few Tables, which, occasionally consulted, may so far guide the unpretending reader as at least to prevent his being betrayed into gross errors, upon a matter beset with difficulties and involving considerations of a delicate and complicated nature.

(II.) In the first part of this work, the various modes according to which the power of Compound Interest is susceptible of operating have been traced with reference to specific and absolute periods of time: we have now to view a similar operation connected with the constant uncertainty that attends the continuance of life; whence all calculations, in this instance, are subordinate to the consideration of *Probability*.

(III.) When, in any stated order or system of events, the general laws that govern them in the aggregate are directly known, or at least may be inferred from an adequate series of correct observations; whilst the secondary laws, to which those events are individually and variously liable, not only remain concealed from our view, but also escape all power of observation, there results from this state of things what is called *Possibility*, or *Chance*; whence is derived the idea of *Probability*, which implicitly or explicitly assigns to the former a moral value.

Probability, in its vulgar acceptation, implies only a certain undefined notion of likelihood, or preferable chance, concerning the realization of any future and admissible event; but *Mathematical probability* is not confined to that vague meaning, as it numerically specifies the degree, or value, of each probability compared with *Absolute certitude*, the latter being the *maximum* of probabilities. Whence mathematical probability may be considered in the light of *Relative certitude*.

(IV.) First general Principle. Towards establishing any mathematical probability, it is requisite comprehensively to embrace all the possible events that depend on a stated order of things; to discriminate and classify those events, resolving them into a certain quantity of cases, whether individual or collective, to which an equal possibility attaches; and to ascertain the quantity of those cases that militate in favour of the realization of the specific event which is the matter of consideration. Then, the fraction of which the latter quantity is the numerator, and of which the former quantity (or the whole of the possible cases) is the denominator, will express the probability of that event; at the same time as another fraction, consisting of the difference between the preceding one and *unity* (taking this as the expression of *Certitude*,) will also express the contrary probability, that such an event will not take place. Further, the addition of all the individual probabilities, existing under any order or system of possible events, will amount to neither more nor less than *unity*; as it is evidently certain of any event in expectation, that it will be realized, or that it will not; and it is no less certain, that if any series of numbers are mixed together in a wheel, from which one of them is to be extracted at hazard, such eventual number will be one of those that the wheel contained.

To exemplify the foregoing positions, let us suppose a quantity of events, A, B, C, D, &c., all of which ascertained to be possible in an equal degree; and that the realization of any one amongst them, to the exclusion of the rest, is consigned to the decision of chance; then the expression of the probability, indiscriminately attached to each of those events, will be *unity* divided by their whole quantity. If *two* events only, A and B, the probability of each will be $\frac{1}{2}$; if *three*, A, B and C, it will be $\frac{1}{3}$; if *four*, A, B, C and D, it will be $\frac{1}{4}$; and so on, for any other quantity of equal chances; whilst the sum of all the probabilities will amount to *unity*, in each of those instances.

But let us, on the contrary, suppose some ascertained and specific inequalities of chance attached to the pending events, A, B, C, &c. If the quantity of events is limited to A and B, and if the chances between them are so distributed that the former has only a single case favourable to its realization, whilst the latter has *two* favourable cases,—the *three* individual cases being possible in an equal degree; then the probability of A will be $\frac{1}{3}$, and the probability of B will be $\frac{2}{3}$. If *three* events, A having *one*, B having *two*, and C having *three* cases, respectively favourable to them, with an equal chance or possibility attached to each of those *six* cases; the probability of A will be $\frac{1}{6}$, that of B will be $\frac{2}{6}$, and that of C will be $\frac{3}{6}$; altogether amounting to $\frac{6}{6}$, or to *unity*, as before. And if we further suppose A, signifying *one* Black ball, B signifying *two* White balls, C signifying *three* Red balls, and D signifying *four* Blue balls; all mixed together, and one only of which to be extracted at hazard; it is clear that the probability of extracting any specific ball, amongst the whole *ten*, will be exactly $\frac{1}{10}$; at the same time as the probability of *a Black* ball will also be $\frac{1}{10}$, that of a *White* ball $\frac{2}{10}$, that of a *Red* ball $\frac{3}{10}$, and that of a *Blue* ball (indiscriminately considered) $\frac{4}{10}$.

When under those or any analogous supposition, the probability attached to a specific event is exclusively considered, then the sum of probabilities militating in favour of all the other events belonging to the same system of things, and collectively taken, constitutes a probability directly opposed to the former. Thus, in the last stated supposition, the probability of a *black* ball not being extracted must be understood to be $\frac{9}{10}$; that of a *white* ball not being extracted, $\frac{8}{10}$; that of a *red* ball not being extracted, $\frac{7}{10}$; and the probability that not one of the *blue* balls will be extracted, $\frac{6}{10}$ only.

What has been hitherto said, towards illustrating our first general principle, no less applies to regularly constituted hazards of all other descriptions imaginable. From the casting of *two* dice, in which each face of the one is susceptible of combination with the *six* faces of the other, there results 36 chances, that may be taken as distinct events in one system; whence the probability of each event will be $\frac{1}{36}$. But in another system, deduced from especially considering the sum of the two *points* that may eventually be turned up, there are only the points 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12; limiting the quantity of events to 11, which then possess different probabilities, according to the unequal distribution of the 36 particular cases that have each an equal possibility, and are severally favourable to some one of the events considered. In the same manner, the casting of *three* dice affords 216 positions or individual cases equally probable, with not more than 16 events amongst which those 216 positions are capable of being distributed; namely, the points comprised between 3 and 18 inclusive; and in either of those systems, or in any other analogous system, the mathematical probability of each event is always equal to the sum of the cases which, being possible each in the same degree, may be favourable to the realization of that event, the said sum divided by the totality of cases.

Extending the same principle, with its self evident inferences, to the consideration of those chances by which the duration of human life is affected; further supposing it a fact ascertained from an adequate course of observations, that, amidst any given population, the quantity of coexisting individuals aged 21 years is generally reduced to *one half* of that quantity remaining alive after a lapse of 35 years more; and that out of a similar original quantity, the survivors after the expiration of 44 years are only *one third* part thereof; if all other probabilities which that particular order of things may involve are discarded, it will necessarily follow that each person at the age of 21 has a probability equal to $\frac{1}{2}$ of attaining the age of 56, and a probability equal to $\frac{1}{3}$ of attaining that of 65 years revolved. A consequence of which is, that in case of any sum of money staked upon each of those respective events, and admitting the same to be ultimately realized, those sums should produce, as a just equivalent for the unfavourable chances incurred,—in the former instance an increase equal to twice the staked sum multiplied into the proportion of its improvement at Compound interest during 35 years,—and in the latter instance, an increase equal to thrice the staked sum, together with 44 years improvement also at Compound interest. However important the consideration, that the probabilities attending the continuance of life may be very different, for individuals of similar age, yet existing under various conditions of health and various other circumstances capable of especial influence upon the probabilities of life, this consideration may be dismissed in the present application of a fundamental principle of the Doctrine of Probabilities; our view being here confined to generalities. The cases requiring discrimination will be duly noticed hereafter.

(V.) It is to be stated only as a corollary of our first principle, that the probability attached to the realization, indifferently, of either amongst two or more possible events depending on any single trial of chance, is equal to the sum of their separate probabilities, then considered as merely relative to different cases favourable to an identical event. Thus in a preceding supposition of *ten* balls, of *four* different colours—A, B, C and D, the probability of indifferently extracting A or B is $\frac{3}{10}$; that of indifferently extracting A or C is $\frac{4}{10}$; that of C or D is $\frac{7}{10}$; that of B, C, or D, indifferently, is $\frac{9}{10}$; &c. &c. But care must be had not to misapply this rule, by extending it to any plurality of cases that might depend on trials of chance independent of each other. For example: if on an average of all persons aged 21 years, 3 out of 5 live to accomplish their 50th year, thus establishing the probability $\frac{3}{5}$ that any one amongst such persons will attain the latter age; it is not thence to be inferred that the probability of attaining the age of 50, for either of two persons aged 21 and considered indiscriminately, should be $\frac{6}{5}$, a fraction even exceeding *unity* or the expression of absolute certitude. Such an inference must always be absurd, as more or less probability evidently attaches to the contrary event; and it might so happen, that not only two, but many more lives of persons taken at the age of 21 years each, were wholly extinct before the accomplishment of a period of 29 years. The false inference would then arise from mistaking the events that depend on distinct trials of chance, for those that are dependent on a single trial.

(VI.) **Second general Principle.** When any two or greater quantity of possible events are independent of each other, so that their coincident occurrence must be the result of distinct hazards assigned for producing those events; or in the similar case of successive repetitions of any particular description of hazard, in which each event, exclusive of any other, is made to depend on a specific trial; then the probability attached to the coincidence of those different events, in whatever quantity, is exactly equal to the product of their respective probabilities multiplied into each other.

To exemplify this position, suppose two equal chances A and B, the probability of each being $\frac{1}{2}$, and suppose any quantity n of successive trials of those chances; the probability that either A or B will be consecutively realized 1, 2, 3, 4, 5, &c... to n times, as the result of trials especially assigned, will be respectively $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}$, &c... to $\frac{1}{2^n}$; and similar probabilities will attach to the corresponding realization of both chances A and B, the same quantity of times between them, either alternately or in any other predetermined order. By analogy, if the probabilities were $\frac{1}{3}$ for A and $\frac{2}{3}$ for B, the probability of repeatedly realizing either A or B any stated quantity of times, or of realizing both those chances the same quantity of times in any successive order whatsoever, would be easily determinable by the same rule; and also in case of any other expressions of individual probability.

If we suppose a perfect cube, such a die, the probability favourable to each of its *six* faces will be $\frac{1}{6}$; and consequently, that of repeatedly producing any one of those faces a given number of consecutive times, or otherwise an equal number of times various faces of the die in any pre-assigned order of succession, will be according to the progression $\div \frac{1}{6} : \frac{1}{36} : \frac{1}{216} : \frac{1}{1296}$: &c. . . . to $\frac{1}{6^n}$. But the probabilities would be very different from those, under the supposition of casting more than one die at each time or trial of chance; unless a specific face were assigned to be eventually turned up by each of the dice in particular, which then would be equivalent to casting any single die successively.

It may be sufficient lastly to exemplify our second general principle in a question concerning the uncertain duration of human life. Suppose that amongst any given number of coexisting persons, each of whom aged 15 accomplished years, *one third* part were the ascertained proportion of those whose life should extend to the accomplishment of their 64th year; and that the proportion of survivors, after a similar lapse of 49 years, were likewise ascertained to be *one fifth* part of any quantity of persons taken amongst those aged 23 years; the probability that two persons, the one aged 15 and the other 23 years, will both continue alive until the former attained 64 and the latter 72 years of age, must be expressed by $\frac{1}{3}$ multiplied into $\frac{1}{5}$, or by the fraction $\frac{1}{15}$, the true expression of such probability.

(VII.) Third general Principle. When two successive events are under mutual dependance, so that the occurrence of either, in the first instance, should influence the probability relative to the second event; then the initial probability of the double event is represented by the product of the probability relative to the event first expected, and multiplied into the remaining probability of the second event, the latter probability calculated on the admission of the first event having occurred. And if any more than two events under similar dependancy; the probability, that any stated combination of those events will be realized, is equal to the product of the initial probability of the event first expected, that probability multiplied into the remaining probabilities, each of which calculated from successively assuming the actual realization of all the events that are to precede, and whose respective probabilities have been pre-established.

Suppose A, B and C, to contain each one ball; *two* of them are *white* balls, a third is a *black* ball; and it is inquired the probability that the two white balls are contained in A and B. The probability that A contains a white ball is evidently $\frac{2}{3}$; and assuming the fact, there remains the probability $\frac{1}{2}$ of B's containing a white ball also, as the uncertainty will be equally divided between B and C; whence the probability of the double event is $\frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$. If we further suppose A, B, C and D, to contain *three* white balls and *one* black ball; the probability that all the white balls are contained in A, B and C, will be $\frac{3}{4} \times \frac{2}{3} \times \frac{1}{2} = \frac{1}{4}$. Indeed it is clear, that in the event required by the first supposed case, C only could contain the single black ball, the probability of which was $\frac{1}{3}$; and that in the event required by the latter case, D only could contain that black ball, the equally evident probability of which was $\frac{1}{4}$.

(VIII.) Fourth general Principle. When the object of expectation is a Sum of money, depending upon any event, however doubtful, but the probability of which is susceptible of ascertainment; or when it depends upon the coincidence of a plurality of events independent of each other, or again upon the successive occurrence of events under any mutual dependance, and even when the occurrence of any one amongst them should necessarily exclude the possibility of one or more others; the value of such expectation is, in all cases, equal to that sum of money multiplied into the fraction expressing either the initial probability of the single event, or the ultimate probability resulting from a combination of the individual probabilities relative to the various events together to be considered. This value is referable to the period or periods of time at which the events are susceptible of accomplishment; otherwise it is reducible to a present value, by discount according to the consideration of Compound-interest at a certain rate; and this last value is the sum for which the expectation might justly be compromised, in case that the expectant preferred a composition, rather than to abide by his uncertainty.

(IX.) The following question involves an application, altogether, of the four general principles hitherto exposed.

By admitting certain Tables of Mortality, and by applying the *first* general principle (IV) to the consideration of the proportion of survivors after a stated period, out of any quantity of co-existing persons respectively of certain ages at the commencement of that period, it is inferred these successive probabilities; 0·8725, that a person aged 20 will attain 30 years accomplished, 0·8430 that he will afterwards attain 40 years, 0·8042 that he will thence attain 50 years, 0·7189 that he will subsequently attain 60 years, 0·5509 that he will further attain 70 years, 0·2950 that he will from this last age attain that of 80 years, and 0·11036 that he will ultimately attain the accomplishment of his 90th year. Having premised those data, it is further supposed A aged 60, B aged 40, also C aged 20 years; and that a certain advantage is to accrue in the event, altogether,—of A, B and C's co-existing during a period of *ten* years,—of B and C's co-existing during ten years more,—and of C's life continuing ten years longer than this last period, or until he attains 50 years of age. Then, and by applying the *second* general principle (VI), we have 0·5509 × 0·8042 × 0·8725 = 0·3865, expressing the probability of A, B and C's lives jointly continuing until the expiration of a first period of ten years; next, and by combining the application of the 2d and 3d principles, we have 0·3865 × 0·7189 × 0·8430 = 0·2343, expressing the probability that the lives of B and C will jointly continue ten years after they had co-existed with A during a first similar period; and further we have 0·2343 × 0·8042 = 0·1884, expressing the probability that C will live ten years after having co-existed with B during the ten preceding years, as also with A and with B during ten years before that time. Whence, and supposing a sum of £ 10,000 forthcoming in case of those events being accomplished, that expectation might fairly be compromised at the outset, for a *certainty* of receiving, at the expiration of 30 years, a sum of £ 1884, resulting from £ 10,000 multiplied into the probability 0·1884; or else for immediately receiving the discounted value of £1884 forthcoming after 30 years, which reduces the latter sum to that of £574, admitting compound interest at the rate of 4 *per cent. per annum* and half yearly instalments, as may be seen in *page* 21st of the Tables.

But reversing the order of the conditions specified in the above question, and supposing the advantage of £ 10,000 to depend on the event of A, at first aged 60, attaining 90 years of age, after having co-existed to the age of 80 jointly with B who is twenty years younger than him, and to the age of 70 jointly with B and with C, the latter being twenty years younger than the preceding and forty years younger than A; the probabilities, in that case, would be 0·3865 (as above) of A, B and C's co-existing the first ten years, 0·3865 × 0·7189 × 0·2950 = 0·08198 that B and A co-existed during the next ten years, and 0·08198 × 0·11036 = 0·009047 that A continued alive ten years beyond the accomplishment of those first two periods under the conditions attached to them. Whence, and under the supposition we departed from, the value of such expectation would be either £90·47 receivable as a certainty at the end of 30 years, or else immediately its discounted value, which is 90·47 × 0·30478 = £27. 11s. 6d. according to the Table of Compound-interest already referred to.

(X.) Fifth general Principle. The present value, reduced to certainty, of any advantage collectively expected as depending on a plurality of events, when the occurrence of each is to produce some partial and distinct advantage, will be equal to the sum of the several products of the probabilities of those events, respectively multiplied into the specific advantages attached to their accomplishment; and this rule applies in either case, of those events excluding each other or not.

Suppose two equal chances Y and Z; that the event Z, if realized at a first trial, should produce an advantage of £20; and that if realized at a second trial of chance, the event Y being realized at the first, it should produce an advantage of £50; the whole expectation will be worth £20 multiplied into $\frac{1}{2}$, or into the probability attached to the first condition, *plus* £50 multiplied into $\frac{1}{4}$ or the probability of the second condition; together £10 + £12. 10s. = £22. 10s., for the *certainty* of which the aggregate of those expectations may be compromised. But supposing, that independently of £20 advantage attached to the realization of Z at a first trial of chance, an additional expectation of £50 were to depend on the event of Z being unconditionally realized at a second trial; then the value of those expectations, considered in the aggregate, would be £20 × $\frac{1}{2}$ = £10, *plus* £50 × $\frac{1}{2}$ = £25, together £35.

Supposing again, as in the preceding *section*, A, B and C, respectively aged 60, 40, and 20 years; that an expectation of £1000 depended on the joint continuance of their lives during ten years; and that £2000 further depended on the joint lives of A and of B only, but to continue ten years longer; the value of the first expectation would be £1000 × 0·3865 = £386. 10s.; that of the second expectation,—depending on the probability 0·1628 of A (aged 60) living 20 years, combined with the probability 0·5781 of B (aged 40) living the same time, which makes the probability of their joint lives during that period 0·09394, —would be £2000 × 0·09394 = £187. 17s. 6d.; and the united amount of those expectations therefore £574. 7s. 6d., reducible to a *discounted value* under the consideration of Compound-interest at a certain rate, in case of exchanging the two expectancies against a sum of money payable at the outset.

But we may, on the contrary, suppose a case in which £1000 depended on the event of either life, A or B, dropping before the expiration of *ten* years; and in which £2000 depended on the event of A, B and C, jointly co-existing for *twenty* years: those two expectations being mutually exclusive. Calculating from the same general principle, we find (the probability being 1—0·3865 that either of the lives will drop) £1000 × 0·6135 = £613. 10s., value of the first expectation; and £2000 × 0·07918 (the probability of the three lives co-existing for 20 years) = £158. 7s. 8d., value of the second expectation; the united value of both, independently of the consideration of *discount* relative to the periods of 10 and of 20 years, being £771. 17s. 8d.

Observe, however, that in those various cases no positive loss is admitted to be incurred by the expectant, in failure of either object of his expectation; which otherwise would bring those cases under the application of the next general principle set forth.

(XI.) Sixth general Principle. When considering in the aggregate any series of probable events, from the accomplishment of some amongst which is to result a gain, and from that of some others a loss, the value of the whole expectation may be either *positive* or *negative*; as it is equal to the sum of products of the probabilities relative to those events which are favourable to the expectant, respectively multiplied into the specific advantage attached to the accomplishment of each,—*minus* the sum of products of the probabilities relative to such of those events as are unfavourable to him, and in like manner multiplied into the loss or disadvantage which is to result from each.

This principle is obviously no more than a corollary of the preceding, and scarcely requires any illustration.

If amongst three events jointly considered, the accomplishment of X is to produce a gain of £50, that of Y is to produce a gain of £75, and that of the event Z is on the contrary to produce a loss of £100,—those events being equally possible, and their mathematical probabilities therefore being uniformly $\frac{1}{3}$; the whole expectation, taken together, will be worth exactly £8. 6s. 8d., equal to the excess of $\frac{50+75}{3}$ over $\frac{100}{3}$. But if the probabilities, instead of being on a par with each other, were $\frac{1}{6}$ for X, $\frac{2}{6}$ for Y, and $\frac{3}{6}$ for Z; then the whole expectation would be valuable only as $\frac{50}{6} + \frac{75}{3} - \frac{100}{2} = -$£16. 13s. 4d., which negative quantity indicates a disadvantage in the aggregate. All analogous cases are to be treated in the same manner.

(XII.) The Doctrine of Probabilities further rests on other principles, the development of which is the less called for on this occasion, as their application, sometimes involving mathematical operations of a transcendant description, chiefly relates to philosophical questions, and therefore would be foreign to the purpose of this book.

On the foregoing six general principles, and on their necessary inferences, are founded the rules exposed at great length by Dr. Price and by other authors, for executing the calculations concerning Life-annuities, Reversionary payments, Surviverships, Endowments, and generally all transactions referable at the same time to the operation of Compound-interest and to the uncertain duration of human life. We refer our readers to those rules, admitting them without discussion; and now proceed to explain what must be understood by the Laws of Mortality,—in what consists the information obtainable by consulting the various Tables of mortality that have been published,—the useful application of which they are susceptible,—and the caution necessary against being led into error through their indiscriminate consideration.

(XIII.) Amongst any stated and considerable number of persons born, the proportions according to which their lives successively drop at several stages of existence, or from year to year, until the whole number becomes extinct, are not alike in different climates, nor even in different countries under similar degrees of latitude; neither are they, in the same countries, exactly the same with reference to each sex; and they are especially dissimilar, in respect to different circumstances of human existence that may be discriminated in classifying any entire population. The differences in those proportions are great, between a cold climate and a temperate one; but respecting the influence of remarkably elevated temperatures upon the annual decrements of life, and upon the average of its duration, no sufficient data is possessed for establishing any calculation. Without going farther than Europe, the average term of human life is sometimes very different between countries subject to nearly the same temperature, though such difference may not be ascribed to any known cause; as (for example) between the Duchy of Milan and France, the average of life is ascertained to be 3½ years less in the former than in the latter. Even in any one country, the observable proportions, in the annual decrements of life, differ not inconsiderably with regard to the inhabitants of mountainous parts or those of valleys, to the residents on a dry soil or those on marshy land, and to those who dwell near the sea or otherwise in tracts remote from it. Amidst various other causes, eminently favourable to the protraction of human life, are however to be considered, independently of a primary healthy constitution, the habitual breathing of salubrious air, the adequate supply of wholesome food, the exemption from extreme vicissitudes and incessant cares,—from intolerable labour of body or mind,—from the exercise of dangerous professions,—from excesses,—from vice and its consequences. Whence obviously follows, that in large cities and in many manufacturing towns life is comparatively short; of which fact London (that immense receptacle of all human miseries) affords, by its Bills of Mortality, a most remarkable illustration.

On the other hand, so great is sometimes the difference between the probable Expectations of forthcoming years of life, for persons even of the same age, that the ultimate result of a selection in considerable number amongst the best lives at 5 accomplished years, when that Expectation is a *maximum*, would exhibit *one half* of that number attaining their 60th year, *one quarter* their 75th, and *one eighth* part fully accomplishing 80 years of age; whilst similar proportions do not respectively outlive their 41st, 59th and 70th years, upon an average of all *London* lives, originally taken at the same age of *five* years accomplished.

If to those considerations be added that, from obvious causes, the lives of females, particularly at an advanced stage, are generally better assured than those of the males; and that an extension of three years, to the average of life such as it has been heretofore calculated, would probably result from the total extirpation, by means of vaccination, of a destructive disease,—admitting no other to be introduced instead; it will justly be inferred that, concerning the human race, there is no law of Mortality admissible as universal under all circumstances, or susceptible of being indiscriminately applied, towards calculating with a sufficient degree of accuracy either the value of Life-annuities or that of expectations depending on survivorship, nor towards guiding with a near approach to perfect correctness any operations relative to the investment of capital, in whatever mode or shape in which the uncertain duration of life is implicated; and that all private transactions of that description, between one individual and another, require to be proceeded upon with greater caution than is usually practised.

(XIV.) Notwithstanding that the natural law by which, at each stage of human existence, the average period of its further endurance, together with the proportion of individuals destined to attain any other specific stage, may seem to elude all means of detection, the deficiency of accurate knowledge, in that respect, is capable of being in a great measure supplied by experience, during a long course of well-directed observations. We are thus informed that, in the same countries or districts, the general results of those observations have continued very nearly the same for many successive generations; proving at least the constancy of nature's laws of mortality, upon which in a multitude of instances we are called upon to place an implicit reliance. We are informed, secondly, that in each country, or particular district, the series of observations have also yielded similar results at various times, regarding any selection of individuals in considerable number, and collectively considered as living under certain general circumstances susceptible of assimilation. In very extensive countries, those observations could seldom, and for any length of time, embrace the whole population. In

Sweden and in France, however, the means of accurate observation have been generally afforded throughout their extent; whilst the defective character of the birth registers, in England, has hitherto deprived us of the like benefit. In this as well as in some other countries, the observations alluded to, and however attentively they may have been proceeded upon, were therefore confined to certain towns or districts of very limited population; otherwise to select classes, such as Government-annuitants, and sometimes to persons in monastic retirement. But although the laws of mortality, as concluded from experience under that variety of aspects, exhibit corresponding differences equally remarkable; in the whole, a sufficiency of statistical observations is possessed for enabling, by a comparison of them, to establish the proportions according to which the decrements of life are operated from one year to another, under the consideration of general circumstances duly discriminated, and also to establish with tolerable accuracy the actual state of a given population in its manifold subdivisions.

(XV.) It was not long before the close of the *seventeenth* century, that the Doctrine of Chances and of Probabilities began to attract the special attention of scientific men, who then applied that doctrine to the consideration of human life, and to various questions of statistics and of political arithmetic. With a view to those objects, Dr. Halley published the first Table of Mortality that is on record, and which he deduced from a series of experimental observations made at Breslaw in Silesia: other observations have since been collected in different parts of Europe, the compared results of which, reduced to Tables, exhibit very great discrepancies. Various considerations may prescribe the preferable application of either of those tables. For example: when the Government or any incorporated society proceed to grant Life-annuities, it is always probable that they will have chiefly to deal with a selection of the best assured lives, whence it becomes expedient to establish the calculations upon such Tables as exhibit the slowest decrements of life that may be admissible; and on the contrary, in case of receiving certain sums, either in a single payment, or else in the shape of an annual premium or any other periodical payments depending on the continuance of life, as the supposed equivalent either for capital to be paid at the period of death, or for annuities whatever and then to commence, it is requisite, from reversing the above consideration, to adopt some table of mortality generally exhibiting rapid decrements of human life; without which distinction no society incorporated for those purposes could subsist for any length of time, and no government could assume transactions of a similar description without a notable disadvantage, which has sometimes occurred.

Many such tables, with results of calculation thence deduced concerning the value of Life-annuities and other prospective transactions, are introduced into Dr. Price's and other works. Before it is proceeded to place in a comparative point of view those and other valuable tables, not generally known in England at the period of the earlier publications just now alluded to; with comparative statements, also, of their various results and deductions susceptible of practical application; it may be proper to explain the method of constructing any Table of Mortality, and that of inferring from it, altogether, the average of forthcoming years of life belonging to persons of any stated age,—the probabilities attached to any expectation of life's continuing during any assigned period,—and a classification of the proportionate quantities of persons co-existing at each age respectively, with reference either to an entire population or to any selection from it.

(XVI.) Correct Tables of Mortality, relative to any country or district, should originate in the legal obligation, strictly enforced, to inscribe within the shortest delay, and in registers of unquestionable authenticity, all the births and all the deceases that occur; with the precaution, amongst others, of referring each decease to the identical person whose birth at a precise period has been previously ascertained. Nothing short of legislative interference could in a sufficient degree secure the regularity of those proceedings; and it is only after their uninterrupted continuance, during a very long period, that the conclusions deduced from them may be such as to warrant any reliance. In England, amidst the enormous neglects tolerated by established custom in respect to the records of life and death,—the registers of baptism being tainted with more or less uncertainty as to the time of each birth, whilst a great part of the population have scarcely a distinct notion of their age,—any attempt at constructing a general table of mortality applicable to the whole country, or even such a table of that description as with satisfactory approach towards exactitude might refer to any considerable portion of its inhabitants, would be absurd: it is an object in all probability unattainable for a century to come. At Northampton, at Chester, and in a few other towns and parishes, registers of the births and of the deceases have been kept with all practicable accuracy during many years, for which we are exclusively indebted to the laudable attention of some gentlemen possessed of local influence; but the circle of their observations has been too limited for answering general purposes. The Northampton tables, however, are usually considered as a specimen of regular decrements, applicable to a quality of lives rather inferior to their general standard in England; whence those tables are chiefly used, as the safest, for regulating the premiums of Life-assurances. On the contrary, the tables deduced from the registers kept for the town of Chester, and for the parish of Holy-cross (near Shrewsbury), afford an eligible specimen of the decrements amongst the best lives in this country.

It were desirable that the British government adopted effectual means of obtaining, in process of time, accurate returns concerning the population divided into certain classes, and concerning the law of mortality to which each of those classes is subjected: the results would be fully worth the incurred expense.

When any regular and complete system of registring births and deceases is acted upon, it becomes easy to construct a table of life-decrements from each stage of human existence to the next, and to deduct from that table all other data requisite towards the objects under our present consideration. The greater the inscribed number of births and of corresponding deaths, the more accurate will be the general results inferred from them, and the greater safety also in applying those results to the calculations concerning Life-annuities, reversions, and other prospective transactions; but the number of inscriptions should always be considerable, without which the results could not be entitled to credit.

The mode of proceeding is as follows:—

(XVII.) After having ascertained the quantity of individuals who respectively died before the accomplishment of their *first*, their *second*, their *third*, or other more advanced years of life; the successive subtraction of those quantities, beginning with the first, from the total quantity of births, will leave a series of quantities representing those of the individuals who remained alive at the commencement of each year. Let that total of births be noted, as corresponding with the year 0 of existence; let the results of the above-mentioned subtractions be also noted to correspond with a *first*, a *second*, a *third*, &c., accomplished year; and considering the rapid waste of life during the first two years, it will be proper to discriminate the half-yearly results of observation referable to that early stage. This process continued, until the whole quantity of lives originally inscribed be disposed of, will exhibit a Table of Mortality, or of the decrements of human life, admissible as average results, with reference to any country at large, to any town or district, or to any particular class of persons selected from the general population as the subject of that table.

(XVIII.) The aggregate amount of years,—during which all the individuals inscribed in the Table of Mortality, from the period of their birth or at the age 0, have continued to live,—being divided by the number of those individuals, yield a certain quantity of years which is the *absolute average of life*. Considering, in the same manner, the aggregate amount of years, during which any number of persons thus inscribed, as having attained any specific age, have continued to live beyond that age; and dividing such aggregate amount by that number of persons, the quotient will express, in a certain quantity of years also, the *relative average of life*, referable to individuals having already attained the specific age first considered.

From this mode of framing any Table of Mortality, it is obvious that the calculations pointed at are executed by unavoidably substituting, for absolute quantities, certain mediate quantities viewed as sufficiently approximative.

(XIX.) Therefore, the quantity of individuals who, taken at the age 0, have not lived until the accomplishment of their first year, may be considered as having averaged *one half* of a year's existence; the quantity of those who accomplished their first, but not their second year, may be averaged at 1½ years; the quantity of those who accomplished their second, but not their third year, may likewise be averaged at 2½ year's each; and so on, for every succeeding age. By multiplying those quantities into their respective averages, ½, 1½, 2½, 3½ years, &c., until the whole number of original lives be disposed of; and by summing up those various products, the aggregate alluded to, in the first clause of the preceding *Section*, will be obtained. In case of half-yearly returns of mortality for the first two years, as already recommended, there will be, instead of ½ and 1½, the several averages ¼, ¾, 1¼ and 1¾ years of life; into which last quantities, certain corresponding numbers of individuals should then be respectively multiplied. A shorter process, however, will lead to the same result of expressing the absolute average of life; it is that of summing up the quantities of living persons of all ages, as inscribed in the Table, dividing the whole by the quantity of births, and lastly subtracting *one half* of a year from the quotient; but the latter mode of proceeding excludes the inscription of half-yearly returns of mortality, which would induce a considerable error in the result.

The *Absolute average of life* is of little import in a practical point of view. It has scarcely any other utility than as it further expresses, under the consideration of a stationary population (or one in progress neither of increase nor of decrease), the proportion subsisting between the whole quantity of people and that of the annual births amongst them, supposed equal to that of the annual deaths.

(XX.) The *Relative average of life* is one of the requisite data for establishing the value of Life-annuities, according to Mr. Simpson's abridged method of approximation; and it is calculable according to the foregoing principle. Taking the departure from any quantity of individuals inscribed in the Table as coexisting of the same age; admitting *one half* of a year as the average life of those who do not attain one full year beyond that age, 1½ years as the average of those who accomplish a first but not a second year beyond the first age, and subsequently admitting 2½, 3½ years, &c., as the respective averages of lives extending between 2 and 3 years, between 3 and 4 years, &c., beyond that stated age; multiplying those averages into the quantities of individuals with which they respectively correspond; and lastly, dividing the aggregate of those products by the quantity of individuals originally considered, the result will be the average of forthcoming years of life, belonging in common to all those individual persons.

The aforementioned shorter process may equally be applied in the present case: add to the number of the living at any specific age, that of the living at all ages more advanced, divide the whole by the first number, subtract *one half* of a year from the quotient, and the remainder will be the average of forthcoming years of life appertaining to those individuals of the age specified.

(XXI.) That *average* of forthcoming years, computed either from the birth or from any other stage of human existence, is what most of the British authors have called the *Expectation of life*. But this denomination is inconsistent and improper, inasmuch as the period of *rational expectation* cannot be any other than that which admits an equal probability, for the expectant, of attaining it or not. That term of well founded expectation, applicable to any given age, is the same at which a stated number of persons of that age should, by the annual decrements (according to the adopted Table of mortality), be reduced to exactly one half of the same number. It may, as depending on the specific age, be either more or less than the average quantity of forthcoming years of life, to which all those of that age are entitled. For new-born infants, that term of *probable life* or of just Expection is about *twenty* years, whilst the average quantity of years' existence indiscriminately falling to their lot is between 28 and 29, at least in England and in France. For individuals having accomplished their *first* year, and for all those under 40 years of age, such term of probable life is more or less superior to that of the relative average; from 40 to 45, those two terms are nearly alike; and above the latter age, to the most advanced age of man, the average of forthcoming years of life is greater than the term of probability, and the difference increases with the respective ages.

(XXII.) The amount of population (supposed to be stationary), classed into certain quantities of individuals of each different age, is easily deducible from a table accurately exhibiting the annual decrements of life. To this effect, admit, as the quantity of existing persons between the ages of 0 and of 1 accomplished year only, one half of the united quantities of deceases that occurred at both those ages; admit in the same manner, as the actual quantities of the living between the ages of 1 and of 2 accomplished years, one half of the united quantities of deceases that also took place at both those ages; and continue, by a similar process, to establish the quantities of the living at the respective ages between 2 and 3, between 3 and 4 accomplished years, &c. to the most advanced term of life; then the total of those quantities of living persons, thus ascertained, will constitute a fair estimate of the whole population under its various divisions relative to age. Inscribe that total quantity in another column of the Table, and in the horizontal line corresponding with the age 0; inscribe in the next horizontal line, to correspond with the age of 1 accomplished year, that same total diminished by the quantity of the living between the ages 0 and 1, which will exhibit the whole quantity of individuals actually existing of the ages of 1 full year or more; and by proceeding to the end, with analogous and successive subtractions of the quantities ascertained as above, of the living at each age,—as also by inscribing each remainder in its proper order,—there will result from this a series of quantities corresponding with each accomplished year of life, and generally expressing the respective quantities of those persons who have either attained or surpassed any stated age.

But, if any constant excess of the annual births, over the annual deceases, should denote a progressive increase in the whole population; then,—and although the proportions in the relative quantities of the living at each age, together with their respective probabilities of life's continuance, will not be disturbed,—the total of those quantities, which otherwise would represent the true state of the population, will no longer do so. For obtaining this true representation, it will be necessary further to add, to that total, the annual excess duly portioned out amongst the living at each age; and the contrary operation must be performed, towards the same object, if the population appeared to be constantly declining.

(XXIII.) With the assistance of a Table thus constructed, and exhibiting, relatively to each age of life, altogether the quantities of the living,—the respective quantities of those who have attained that age only,—and the respective quantities of individuals who died within the last year, which would otherwise have accomplished that precise age,—all the probabilities concerning any forthcoming period either of individual life or of coexisting lives, and those concerning the various casualties of survivorship, are susceptible of being with sufficient accuracy calculated; as also the value of any expectancy, whether single or periodical, and depending on those events; by applying to the data thence possessed, as the case may require, one or more of the *six* general principles exposed in *Sections* IVth to XIth, with reference to the *Doctrine of Probability*.

In a table of the foregoing description, the series that expresses the annual decrements of the living at each age constitutes of itself, and in all respects, a table of the probabilities attending the expectation that may be entertained, at a stated age, of the further continuance of life during any assigned period; and when any question involves the consideration of a plurality of lives, those probabilities admit every requisite combination, upon the general principles already set forth.

The *first* of those principles (IV) establishes that the probability of any single event, in expectation, is represented by a fraction of which the denominator is the whole number of events assumed to be possible in an equal degree, and the numerator is that number only—amongst those events—which is understood will in fact be realized; therefore the probability that any person, actually of the age x, will live until he attains the further age X, is equal to the fraction resulting from the quantity of the living at the latter, divided by the quantity of the living at the former of those ages.

The *second* general principle (VI), applied in the same manner, shews that the probability of *two* or more persons continuing to coexist during any stated period,—whether they be of the same age or of different ages,—is equal, in all cases, to the product of their individual probabilities of living throughout that period, multiplied into each other. And upon this principle, it is always easy to ascertain the probability that any marriage, or other life-association, will endure a certain length of time.

The remaining *four* general principles, set forth in *Sections* VIIth, VIIIth, Xth, and XIth, are equally applicable to a variety of other questions that depend either on the continuance of single or of joint lives, or on the eventuality of survivorship; but the greater or less facility of that application, exemplified in *section* IXth, depends much on the clear understanding and discrimination with which those questions may be stated.

(XXIV.) That *second* general principle is especially applicable in calculating the probabilities of survivorship, between any *two* or greater number of persons.

Thus, the probability that *Paul*, aged x years, will continue in existence during a period y computed from the present time, and then have survived *Thomas* who now is aged X years, is equal to the probability of *Paul's* living from the age x to the age $x+y$, multiplied into the probability that *Thomas* will *not* continue to live from the age X to the age $X+y$.

By the corollary (V), the probability that at the assigned period either *Paul* or *Thomas* will be alive, but not both, is equal to the sum of the last mentioned probability added to that of *Thomas* (on the contrary) surviving *Paul*; calculating the latter on the same principle as the former probability.

And supposing two persons of the same age x, the probability of survivorship will be, for each, *one half* of those united probabilities; which assimilates with the probability that any one person of the age x will continue to live until the age $x+y$, multiplied into the *complement* of that probability, or its difference from *unity*, which difference expresses the probability that a person of that age will *not* continue to live throughout the period y.

(XXV.) It has been established by the *fourth* general principle (VIII), that when the object of expectation is a sum of money, its real value is equal to the product of that sum, multiplied into the fraction expressing the probability of the event upon the occurrence of which its payment is to depend. But this consideration must be combined with that of the operation of Compound-interest; whence such real value, referable only to a future period, is further reducible to a present and discounted value, upon the principle set forth in the *First part* of this book and exemplified by a series of Tables, according to different rates of Interest.

Upon an application of the general principles before mentioned, to the probabilities of life and of survivorship, as deduced from Tables of Mortality assumed to be sufficiently correct, are founded all the transactions undertaken by societies incorporated for the various purposes of granting Life-annuities,—of Assuring lives, (by which is meant to incur the obligation of paying certain sums at the decease of individuals, in consideration of receiving on the contrary, and under the denomination of *premium*, certain annuities terminating with the lives of those individuals respectively),—of purchasing reversionary property, whether consisting of capital or of income,—of endowing either widows, children, or persons in old age,—and generally with any other prospective views; all of which, under such conditions and regulations as may be deemed expedient. But it should not be inferred, from the uniformity of the general principles to be proceeded upon in other respects, that any specific Table, exhibiting the decrements of life as deduced from select observations, could indiscriminately be adapted to such a variety of transactions, frequently having an opposite tendency. The laws of Mortality appear under a very different aspect, when relative to that class of persons who usually stipulate for *Assurances* on their lives, and when relative to the opposite class, or to the generality of persons that stipulate for receiving *annuities* during life. And here again it is proper to remark, respecting stipulations for Life-annuities between individual persons, that the one who receives an annuity of this description, whether on his own or on any other life, constitutes himself the *assurer* of such life; with this difference only, that he yields for the annuity a present equivalent, instead of a capital payable at the uncertain period when the *assured life* may happen to drop; whilst the engagement to pay any Life-annuity, as a solitary transaction of its kind, is at best an inconsiderate one, especially if the calculation be not established upon an appropriate Table of Decrements. A variety of those tables, that either are or may be used, as occasions require, will hereafter be adverted to.

(XXVI.) The transactions engaged into, by the societies mentioned in the preceding *Section*, depend sometimes on the solution of complicated questions, to be proceeded upon with attentive discrimination; for example, in the exchange of reversionary property depending on contingencies, against capital or income made also to depend upon uncertain events, or on the uncertain time of their occurrence. The most proper and simple mode, of executing the calculations relative to such transactions, consists in reducing each object of distinct consideration to a value either in present capital, or in capital referable to any other common period; whence the calculations may be completed by mere additions and subtractions. It is, doubtless, the method practised by those societies.

(XXVII.) The present value of any Life-annuity is calculable, according to the *fourth* general principle, from a Table of the Decrements of life. It is evident that such value can be no other than the discounted values, under the consideration of Compound-interest, and added together, of an equal sum accruing at the expiration of each successive year, and multiplied into the probability of its eventually becoming payable for that year; and it is also evident, that the probabilities attached to those respective payments will be expressed by a series of fractions, having for their numerators the quantities of persons living at the expiration of the *first*, of the *second*, of the *third*, of the *fourth* year, &c., computed from the present age of the life in expectation, and until the last accomplished year of that life; all those fractions having for their common denominator the quantity of persons living at the present time, or at the commencement of the first year; which comparative quantities of living persons, at each age, may be taken from any Table of Decrements thought proper to be adopted. In case of annuities on joint continuance of life, the 2d general principle will further apply.

Tables of the assumed value of Life-annuities, calculated from various Tables of Decrements selected as eligible, and according to various rates of the annual interest of money, have been constructed upon the above-mentioned principle; they are to be found in many works, but more particularly in that of Dr. Price; which, valuable as it is, would be still more so and easier to consult, if the abundant matter it contains were methodically classed.

In all those Tables, the value is stated as corresponding with every *unit* contained in the supposed annuity or sum forthcoming, in a single payment, at the expiration of each successive year during the continuance of life. That mode of expressing the value of Life-annuities indicates certain quantities of years' purchase, in like manner as the *Tables of Compound-Interest* hereto subjoined indicate, in the appropriate column, the value of annuities for terms of years certain; such value comparable, in either case, with the value of a perpetual annuity. What is commonly called the *Value of a Life* is identical with that mode of expression.

When the value of a Life-annuity is calculated on the foregoing principle, it is with an invariable understanding that the annuity is not otherwise payable, than at the expiration of every successive year, computed from the period when it was constituted; and that it ceases to be payable after the last full year is completed. But when, by express stipulation, it is additionally payable, in due proportion, for the portion of time intervening between the last accomplished year and the precise period of extinction of the life,—in which case it is usually called an *Annuity secured on land*,—its value is increased by the amount of half a years' income, discounted from the probable period of termination.

(XXVIII.) Dr. Price has entered at some length into the consideration of the value of Life-annuities, discriminated according to their optional stipulation, either by annual, by half-yearly, by quarterly, or by any other instalments; but it may be unnecessary here to touch upon that subject. Whenever the value of a Life-annuity is established, relatively to annual instalments and to any given rate of Interest, the differences may safely be taken, for shorter instalments, in similar proportions with those observed in the Table of Compound-interest at the same rate, and for an equal or a nearly equal value of the annuity for terms of years certain.

(XXIX.) The principle to be proceeded upon, for correctly ascertaining the value of any Life-annuity, according to a stated rate of interest, has been explained in *section* XXVIIth; and the Synoptical Tables that terminate this *Second Part* and exhibit the values of annuities of that description, with reference to various sets of observations on the decrements of life, have been calculated from a direct application of that same principle. But, the *Tables of Compound-Interest* having already supplied the correct values of annuities for terms of years certain, —at whatever rates of interest, accruing either annually, half-yearly, or quarterly,— an easy and expeditious method is afforded, through that medium, for calculating the values of annuities on single lives and according to any rate of Interest; at the same time as the results will refer to optional instalments of those annuities. This method has indeed been pointed out by other writers; but without the assistance of the last-mentioned Tables, it could avail only in a small degree, towards diminishing the labour of calculation. It is founded upon an hypothesis, originating with Mr. Demoivre (a contemporary of Sir Isaac Newton),—that of Decrements numerically equal for each year of life; and therefore it cannot, with the utmost correctness, yield results expressive of the value of Life-annuities. Yet as that hypothesis comes near the truth, with regard to ordinary lives, between 20 and 70 years of age, those results will make a sufficient approach to exactitude for answering usual purposes, when the method is applied within those limits and particularly to middle ages. It must however be considered inapplicable, without great inaccuracy, to persons either in the earlier or in the later stages of life; as the decrements, in both cases, are very unequal from one year to another.

This method is very simple. Take the *Relative average* of forthcoming years (commonly called *Expectation of life)* belonging to the given age, according to any adopted Table of Decrements, and admit *double* that quantity of years as the *Complement of life**; seek in the *Tables of Compound-Interest* the value of an annuity for a term of years certain and equal to that *Complement*, such value corresponding with the instalments of the supposed Life-annuity, whether annual, half-yearly, or quarterly; multiply that value into *unity* increased by its interest for one year, for half a year, or for a quarter of a year (as it may be); divide the product by that of the *Complement* multiplied into the fraction expressing the *ratio* of interest for a whole year,—and subtract the quotient from the value of a *perpetual annuity* according to the stated rate of Interest: the remainder will be the *present value* of that Life-annuity.

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* The *Complement of life* is an imaginary quantity, frequently used for abridging the calculations.

First Example. Suppose the age 45 accomplished years, the rate of Interest 3½ *per cent. per ann.*, the instalments *yearly*, and the adopted decrements of life to be those deduced from the observations on the *Male population of Sweden.* The Table hereafter (No. II.) shews the *Expectation*, for a life of that age and of that class, to be 20·712 years; whence the *Complement* is 41·424 years. The Table of Compound-interest (*page 12th*) indicates, as the value of an annuity for this last term of years certain, 21·69907 years' purchase, when payable by full yearly instalments (taking the due proportion between 21·59910, the value for 41 years, and 21·83488 the value for 42 years). Multiplying 21·69907 into 1·035 (*unity* increased by its Interest for *one instalment*), the product is 22.45854. Dividing the latter by 1·44984 (the *Complement* 41·424 multiplied into 0·035 the *annual ratio* of Interest), the quotient is 15·49036; which subtracted from 28·57143, the value of *Perpetuity* (indicated by the *last line* of the same *page 12th),* leaves 13.08107 years' purchase, which is the value of an Annuity payable by full yearly instalments, and on a life described as above.

Second Example. Suppose the age 60, the rate of Interest 4 *per centum per annum*, but accruing *half-yearly*, and the Decrements of life to accord with the *Northampton* observations. The *Expectation* will be found 13·216, and therefore the *Complement* 26·432 years. The value of an Annuity for this last term of years certain, and admitting half-yearly instalments, is 16·22266 (by Table *page 20th*, and consequently to having added to the value of a 26 years' annuity the proportion 0·432 of the difference between that value and the value for 27 years). The quantity 16·22266 multiplied into 1·02 (*unity* increased by *one half year's* interest) is 16·54711, which divided by 1·05728 (or the *Complement* multiplied into the *Ratio* of interest for one full year) yields the quotient 15·65064. Subtracting the latter from 25, which is the value of *perpetuity* at 4 *per cent.*, leaves 9.34936 years' purchase, as the *present value* of an annuity payable by half-yearly instalments, and settled on a life aged 60 accomplished years.

Third Example. Suppose the age 30, the Interest at 5 *per centum per annum*, accruing *quarterly*,—and the Decrements to accord with the observations on the *general population of France*. The *Expectation* then is 28·5177 and the *Complement* 57·0354. The value of an annuity for the latter term of years certain (by Table *page 36th*) is 18·84271 (in consequence of 18·82250, the value for 57 years, and of 18·87858 the value for 58 years). That value 18·84271, multiplied into 1·0125, yields the product 19.07824, which divided by 2·85177, (the *Complement* 57·0354 multiplied into 0·05 the *annual* ratio of Interest,) quotes 6·68996; and this quotient subtracted from 20, the value of

Perpetuity, leaves 13·31004 years' purchase, as the present value of an Annuity to be settled on the described life, and to accrue by *quarterly* instalments.

It is only of minor importance, in such calculations, to discriminate the values of Life-annuities according to the specific intervals of their instalments; in consequence of what has been remarked on that subject, in *Sect.* XXVIIIth; and further because results strictly accurate, in respect to those values, may always be considered unattainable, as a series of data merely *probable* are inevitably proceeded upon.

(XXX.) It is immediately perceptible, that the value of an annuity on any single life,—as expressed by a quantity of years' purchase,—must, in all cases, be inferior to the value of an annuity for a term of years certain and equal either to the probable term of the annuitant's life, or to the average of forthcoming years that may appertain to his age; because the proportions according to which the lives successively drop in, as observable from any table of decrements, are not the same for every year of life, but are less considerable for the years preceding that term of probability than for those that follow,—and because these proportions of annual decrement increase with every year of life's protracted duration beyond that same term.

In other respects, and in like manner with what has been observed (*Part* I. *Sect.* XL.) concerning annuities for terms of years certain, the *Ratio* according to which any Life-annuity is paid, ought to differ from the ratio of a perpetual annuity, by neither more nor less than the fractional quantity which accumulated and improved at compound interest, during the probable period of its payment, would at the expiration of such period create the same capital as was originally invested.

(XXXI.) The equivalent, in present capital, for an annuity limited to a certain term of years supposed n, and at the same time depending on the continuance of life during that term, is (by the same 4th principle) equal to the sum of the different products of each annual payment in expectation,—and reduced to its present value by discount under the consideration of compound interest,—such discounted values respectively multiplied into the corresponding probabilities that the life of the annuitant will endure a *first*, a *second*, a *third*, &c. to the quantity n of accomplished years. If *unity* be admitted to represent the annuity, the calculation will be much simplified by taking the successively discounted values of *unity* from the Tables of Compound-interest; and then the equivalent, inquired after, will be expressed by a quantity of years' purchase, called the *Value of the life* for n years.

(XXXII.) The grant of an Annuity, payable during life, may be subjected to the condition that its term shall not commence to run until the expiration of a certain period of years, expressible by *n*. The equivalent, in present capital, is then equal to the equivalent referable to the expiration of the suspensive term *n*, and calculated according to the preceding directions (XXVII and XXIX); this last equivalent reduced to its discounted value corresponding with that term, and multiplied into the fraction expressing the probability that the life in expectation will endure until the term of the annuity commences to run.

The same result will be obtained by subtracting from the value of a Life-annuity, the term of which should commence to run from the present time, the present value also of an annuity depending on the same life, but limited to a term of *n* years; which last value is calculable as above (XXXI.)

(XXXIII.) The *Assurance of a life*, by which is meant the undertaking to pay a certain capital at the demise of the life assured,—or rather at the expiration of the last year accomplished after that event and computed from the period of the assurance,—may be compensated in two ways; either by an inferior capital once and presently paid, or by an annual premium, the payment of which by the assured party is exactly the reverse of a Life-annuity enjoyed by himself. It is evident that such present capital should be precisely the value of the latter annuity,—the transaction amounting to this; that the assured party borrows a capital, against an annuity upon his own life, which capital is re-invested until required with the amount of its improvement at Compound-interest. The following is an easy rule of calculation.

Let the excess of the value of *perpetuity*, over the value of the assured life, be multiplied into the interest which the capital in expectation should produce for one year; let the product be divided by *unity* increased in the ratio of one year's interest; and the quotient will exhibit the present capital to be paid as an equivalent for the assurance. The division by $1 + r$, as last mentioned, arises from the consideration that the eventual payment is only to take place at the expiration of the year fulfilling the whole term, whilst the equivalent is paid at the outset.

It follows again, that dividing such present equivalent by the value of the life, expressed in a quantity of years purchase (which value the Tables may shew), the quotient will exhibit the annual premium otherwise exigible.

Various motives may induce the *Assurance* of a life for a limited term only. In that case, ascertain (as in *Sect.* XXXI) the value of the given life, for that term, and also its value for one year less than that term; add *unity* to the latter value; divide this sum by *unity* increased by its interest for one year; from the quotient, subtract the value of the life for the full term of the assurance; and the remainder will be the equivalent, payable at the outset, for every unit contained in the capital intended to be assured. This rule, with the preceding and many others, applicable to individual cases into which the present general question branches out, have already been stated and exemplified in Dr. Price's work, edited by Mr. Morgan (who directs the transactions of that excellent institution,—the *Society for Equitable Assurances on Lives and Survivorships*): it is a sufficient reason for here abstaining from any enlargement upon this particular subject.

The prospective views of persons who, under appropriate circumstances, stipulate for the Assurance of Capital, or of any equivalent for Capital, to accrue after their demise and in behalf of their successors, are attended with this moral effect;—that the fruits of industry and of economy, during a period equal to the probable term of any such person's life, may thereby be secured, *as certain* and at all events.

(XXXIV.) Dr. Price has further supplied a method, founded upon analogy, of deducing with sufficient approximation, from the *correct values* of any single life or joint lives,—as calculated at any rate of interest, and from any table of observed decrements,—the *correct* values also at other rates. We must state this method, which may occasionally ease the process of comparative calculations.

He proposes a preliminary problem relative to each case, of a single life and of two joint lives,—assuming, for greater simplicity, the decrements of life to be equal for each succeeding year*; the following solutions of which problem, merely intended for this single purpose, should not however be mistaken for correct ones, nor be otherwise applied.

First. The *Expectation* of a single life being given, as also the rate of interest, the value of that life is thus to be calculated by approximation. Multiply the value of an annuity for a term of years certain, and equal to twice the Expectation, into the value of *perpetuity* increased by *unity*; divide the product by that term of years; subtract the quotient from the value of a perpetual annuity at the given rate of interest, and the remainder may be taken as the value of the single life.

Secondly. The Expectations of any two lives being given, with the rate of interest, the value of the joint lives (meaning that of an annuity during joint continuance of those lives) is then to be calculated as follows. Ascertain the difference between twice the Expectation of the *youngest* life, and twice the Expectation of the *oldest* life increased by unity and by twice the perpetuity; multiply that difference into the value of an annuity certain for a term of years equal to twice the expectation of the *oldest* life, and let the product be divided by that same term of years,—reserving the quotient. Then, from twice the perpetuity, subtract the reserved quotient; multiply the remainder into the perpetuity increased by unity; and dividing this last product by twice the expectation of the *youngest* life, the quotient subtracted from the value of perpetuity will leave the required value of the joint lives. It has been here assumed, that twice the expectation of the *youngest* life would be found *less* than that of the *oldest* life also doubled and increased by unity and by double the perpetuity; but if it should happen to be *greater*, the reserved quotient—instead of being subtracted from twice the perpetuity—must be *added* to that quantity; and the *sum*, instead of the *difference*, must be multiplied into the perpetuity increased by unity.

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* An hypothesis introduced by an early author, already mentioned in *Sect.* XXIXth.

Either of those preparatory solutions being obtained, with reference to any *two* different rates of interest; and admitting a *correct value** of the life-annuity to have been previously ascertained, with reference to either of those rates, the value according to the other rate of interest will be obtained, either by adding to the preceding value, or by subtracting from it (as analogy will point out), a quantity equal to the difference between the results of the aforementioned calculations.

Caution is to be observed, against an error which the argument from *induction only* might lead to. Although the value of a Life-annuity, according to any specific rate of Interest, will coincide with that of an annuity referable to the same rate and for a term whatever of years certain; it should not thence be inferred an equality of the respective differences between each of those values and the corresponding value calculated according to any other rate. Those differences may vary, even to the extent of one half a year's purchase, though the Rates of Interest differed no more than *one per cent.*

(XXXV.) Annuities that depend on a plurality of lives are susceptible of two different descriptions; they may be payable either during the joint continuance of any two or more lives, or during the longest of those lives. In the former case, the annuity is of less value than if it were constituted on either of the lives in particular, because the probability of each is affected with a contingency respecting the other life or lives; and in the latter case, it is of greater value than that of an annuity on the best life amongst the whole, because the probability attached even to that best life is then augmented by the probability—however small it may be—of the worst life eventually surviving.

(XXXVI.) The value of annuities of the first description, or on joint lives, is seldom of any practical consideration, except for the purpose of subsequently calculating either the value of an Annuity on the life of the last survivor, or else the value of expectations depending on survivorship. The value of two or more joint lives is ascertainable on the same principles as those already set forth as applicable to any single life. The fundamental principle is, always, that the present value of any sum in expectation, as eventually payable at a certain period, is equal to the discounted amount of that sum multiplied into the probability of the event upon which its payment is made to depend; therefore, by multiplying into each other the respective probabilities attached to the several lives, of their further enduring *one* full year, *two* full years, *three* full years, &c. until the last year when the annuity may possibly be payable, the product will express the probability of the joint continuance of those lives until the accomplishment of each of those periods distinctly considered; and the sum of the different products of those probabilities, respectively multiplied into the annuity discounted at compound interest for *one* year, for *two* years, for *three* years, &c. until the remotest possible term, will yield the present value required.

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* This expression refers to the direct method of calculation stated in *Section* XXVIIth, and (however tedious) indispensable when great accuracy is aimed at.

(XXXVII.) The value of annuities on the longest of two or more lives, or payable until the extinction of all those lives, is calculable on the afore-mentioned general principles; first ascertaining the different probabilities, that the whole of the considered lives will *not be extinct* at the expiration of a *first*, of a *second*, of a *third* year, &c. respectively; and the rest of the calculation then to be proceeded upon as directed in the preceding Section.

For greater clearness, let us first suppose the annuity to be settled on the longest of *two* lives only, A and B.

Subtracting, from *unity*, the probability that A (according to his age) will live one full year, there remains a fraction expressing the probability of his *not outliving* that first year; and calculating, in the same manner, the probability that B will not outlive the same period, the product of those probabilities multiplied into each other will be the probability that neither A nor B will then be alive. The difference between *unity* and the latter quantity will express the probability that either A or B, indifferently considered, will continue alive at the expiration of a *first* year; and the latter probability multiplied into the discounted value of the sum then forthcoming, but depending on that event, will yield the present value of that first instalment of the annuity. Let similar calculations be executed, with reference to the expectation of the annuity becoming payable at the expiration of a *second*, a *third* year, &c. to the last year of possible expectation; and the united amount of those partial values will be the present value of the annuity, constituted on the longest of the two lives A and B.

In case of *three* or any greater number of lives, the probabilities of their *severally* not continuing until the expiration of a *first*, a *second* year, &c., are previously to be ascertained; those probabilities must be multiplied into each other as above mentioned, with reference to the expectation of each successive year distinctly considered,—which will yield the probability that the whole number of lives will then be extinct; and the latter probability subtracted from *unity* will leave a remainder, expressing on the contrary the probability that *one* at least (indifferently) of those lives will continue to endure. The rest of the calculation may be proceeded with as in the preceding instance of *two* lives only.

This method of calculating the value of the longest life amongst *two*, *three*, or any other quantity, is immediately deduced from the fundamental principles; but it ultimately resolves into an abridged method, producing similar results. It requires that there should be previously ascertained, the value of each life taken singly,—the value of the joint continuance of all the lives,—and lastly, the value of as many collections of joint lives as can be formed by successively excluding from consideration each of the lives in particular.

If *two* lives only, A and B; subtract the value of their joint lives from the united values of their single lives, and the remainder will be the value of the longest life.

Suppose *three* lives, A, B and C. From the sum of their distinct values, subtract that of the values of A and B, of A and C, and of B and C, each of which jointly considered; then add to the remaining quantity the value of joint continuance of all the *three* lives; and the result will express the value of the life of the last eventual survivor.

Further supposing *four* lives, A, B, C and D; add the respective values of those single lives; subtract, from the whole, the sum of the *four* values of joint continuance, ABC, ABD, ACD and BCD; add to the remainder the value of joint continuance of all the *four* lives, and the result will be the value of the longest life amongst them.

Those abridged rules have been first promulgated by Mr. Simpson.

(XXXVIII.) The value of an Annuity, settled on the *longest* of two or more lives of similar age, is always superior to the value of an annuity for a term of years certain, and equal either to the *Expectation* or to the *probable term* of any one of those lives; which probable term extends to about two years beyond that of the *Expectation*, at the age when the latter is greatest. But if the ages are very unequal, the value of such an annuity may be less than that of an annuity for a term of years equal to the longest of the individual Expectations or Probabilities of life.

(XXXIX.) The value of Reversionary property, or of any expectation in the event of survivorship, depends on the conditions attached to such reversions, or to the expectations entertained. The one and the other may consist either of Capital, of Annuities, or of Estates.

The present value of Reversionary Capital, *unconditionally* forthcoming upon the failure of any given life, is the same as the equivalent actually payable for an Assurance on that life, as ascertained in *section* XXXIII. But in case of the reversion being subject to the condition of survivorship, the present value will be equal to the product of the Interest which the expected capital should produce for one year, multiplied into the excess of the value of perpetuity, over the difference between the values of the life in expectation and of the joint lives.

The present value of a reversionary Life-annuity, to a survivor, is equal to that of an annuity on the life in expectation, diminished by the value of the same annuity during continuance of the joint lives.

The present value of the reversion of an Estate, to be *certainly* entered upon after the failure of two lives, is equal to the product of the clear annual income of that estate, multiplied into the excess of the value of a perpetual annuity, over the value of an annuity on the longest of the two lives. But, if the Estate is to be enjoyed upon the failure of *either* of two lives, the present value of such a reversion will be the product of the income multiplied into the excess of the value of perpetuity, over the value of the joint lives.

The latter question branches in *two* others, arising from the consideration that either of the two lives may happen to be the longest. Thus, that question may concern the value of the reversion in respect either to A's expectation, or to B's; and supposing them of the same age, or assuming an equal value of their lives, the object of *certainty* will then divide into *equal probabilities* in favour of them respectively. But supposing their ages different, or assuming their lives to be of unequal value; the value ascertained as above, of the reversionary Estate, being multiplied into the fraction expressing the probability of A surviving B, will yield the value of the former's expectation in particular; and if multiplied into the fraction expressing the contrary probability, or that of B surviving A, the product will in the same manner shew the exact value of B's share in the common expectation. Either of those probabilities, which, added together, will amount to unity, or to the expression of Certitude, is ascertainable; and Mr. Morgan having supplied, in his seventh edition of Dr. Price's Work (*vol.* i. *page* 406 *&c.*) very valuable tables of the probabilities of survivorship between two persons of all ages, we need only refer the reader to them.

The method of ascertaining the respective probabilities of survivorship between A and B, without reference to any specific period of time, has been so clearly stated and demonstrated by the same Mr. Morgan, that it will be quite sufficient to give, in a *note*, the extract from a paper of his upon that subject, and which has been read at the *Royal Society*, in May 1788*.

Supposing any sum of money, depending on a contingent reversion of the last description, to be assigned to some third person, in consideration of another sum presently advanced to the expectant, whether A. or B; it follows from the preceding solution, that those two sums should bear, with each other, the same proportion as that which the present value of the absolute reversion, multiplied into the probability of the unfavourable contingency, bears with the integral object of expectation; independently of the further and indispensable consideration of the reduced value of the future sum, according to the operation of compound-interest.

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* Let a represent the number of living persons (according to the Table of Decrements) at the age of A, supposed the younger of the two lives. Let a', a'', a''', a'''', &c. represent the decrements of life at the end of the 1st, 2d, 3d, 4th, &c. years from the age of A. Let b represent the number of persons living at the age of B the older of the two lives, and c, d, e, f, &c. the number of persons living at the end of the 1st, 2d, 3d, 4th, &c. years from the age of B. Supposing now it were required to determine the probability of B's surviving A in the first year. It is manifest that this event may take place either by A's dying before the end of the year and B's surviving that period, or by the extinction of both the lives, restrained however to the contingency of B's having died *last*. The probability that A dies in the first year, and that B survives it, is expressed by the fraction $\frac{a'c}{ab}$. The probability that both the lives die in this year is expressed by the fraction $\frac{a'.(b-c)}{ab}$; and as it is very nearly an equal chance that A dies *first*, this fraction should be reduced *one-half*, and then it will become $=\frac{a'.(b-c)}{2ab}$. Hence the whole probability of B's surviving A in the first year will be $=\frac{a'c}{ab}+\frac{a'.(b-c)}{2ab}=\frac{a'.(b+c)}{2ab}$. In the same manner the probability of B's surviving A in the 2d, 3d, 4th, &c, years may be found $=\frac{a''.(c+d)}{2ab}\ldots\frac{a'''.(d+e)}{2ab}\ldots\frac{a''''.(e+f)}{2ab}$, &c. respectively; therefore, the whole probability of B surviving a will be …………… $=\frac{1}{ab}\left(\frac{b+c}{2}a'+\frac{c+d}{2}a''+\frac{d+e}{2}a'''+\frac{e+f}{2}a''''\right.$, &c.$\left.\right)$ Having thus found the probability of B, the elder life's, surviving A the younger; the probability of A's surviving B is the difference between the foregoing series and *unity*.

The sum of this series might easily be determined from tables of the expectations of single and joint lives; but no such table as the latter having ever been computed, it will not be a laborious undertaking to compute a table of the probabilities of survivorship between two persons of all ages immediately from this series, without having recourse to the expectations of life. For if the probability of survivorship between any two persons be found, the probability between two persons one year younger is obtained with little difficulty; and by proceeding in this manner a whole table may be speedily constructed.

The above series, expressing the probability of survivorship, may be easily found to be $=\frac{\beta\ .\ (K-AK)-c\ .\ (C-AC)}{2b}$; K denoting the expectation of a life one year younger than B; C the expectation of a life one year older than B; AK and AC the expectations of the joint lives of A and K, and of A and C, respectively; and β, the number of persons living in the table of observations at the age of K.

The questions concerning survivorships and reversionary interests may occur in many other shapes, but they will always exhibit sufficient analogy, with some one of those above described, for inferring with more or less facility the method of solving them, from such solutions as are already pointed out.

(XL.) It has here been avoided, as far as possible, to reproduce details upon which various authors have enlarged on the present subject; endeavouring, at the same time, clearly to expose the fundamental principles not always reverted to by them, respecting the laws of Probability, and upon which only could rest the illustrations from which we have abstained. The analogies of the cases to which those principles however have been applied, with other cases omitted to be noticed though susceptible of frequent recurrence, will be easily discernible when the questions are stated with proper discrimination. The inadequacy of the means hitherto employed, especially in this country, towards obtaining satisfactory returns of the population according to its eligible subdivisions, has left the Doctrine of Life-annuities and of Reversions in a very imperfect and perplexing state; and it may be superfluous to add, that absolute accuracy in the results of calculation, regarding these matters, could but unsuccessfully be aimed at, in consequence of the substitution of merely tolerable approximations, for the more correct data that fail to be supplied. Therefore, in the practical application of the rules laid down for calculating the values of life and of reversionary interests, or for obtaining sufficiently accurate results concerning any other prospective transactions, it is always of paramount importance to class the lives according to their comparative qualities; a consideration that cannot too much be impressed on the reader's mind, and without which those transactions themselves must often be at variance with equity, if not even with common sense.

To the effect of facilitating the necessary classification of lives,—as they may greatly differ in value, though of similar ages,—there now remains to be exposed a series of deductions from actual experience and observations collected in various parts of Europe, concerning the laws of mortality and the decrements of human life at its successive stages. When about to constitute any Life-annuity, the great importance of discriminating the *quality* of the life or lives, during the continuance of which such annuity is to be paid, will be clearly evinced, from the considerable discrepancies observable in the results of calculation founded upon different sources of information.

(XLI.) By offering those results in the shape of Synoptical Tables, the chief purpose of facilitating habitual references will better be answered. This *second part* of our book will therefore terminate with *four* of those Tables; and these are susceptible of a few explanations.

The *FIRST* Table exhibits, as deduced from each set of local observations, the assumed proportions amongst the quantities of living persons at each different age; exposing the natural law by which the waste of human life appears to be constantly regulated. The results there brought into comparison, relatively to each age, have been calculated upon the principle and according to the rules set forth in *Sections* XVII and XXII. If it be considered, that the difference between the quantity of living persons at each age in particular, and the quantity of those living at that age increased by *one year*, exactly represents (at least under the supposition of a stationary population) the quantity of the deceases during such last year, it will become obvious that those proportionate quantities of the living, at different ages, also constitute a Table of the probabilities that are attached, for any given age, to the continuance of life during successive periods of forthcoming years.

In order to render more effective the means of comparison which it is intended by that first table to afford, it were desirable that the various decrements there exposed could have originated with equal numbers of births; but from the many causes productive of irregularity, and of uncertainty, in the statements relative to the earliest stages of life, it was apprehended that such accommodation of the calculations to each other would cause the whole to participate more of illusion than of reality, under a general aspect; and it has been considered preferable to adapt a common *Radix* to the age of *five* accomplished years, at which the Expectation of forthcoming years of life is almost always at its *maximum*. It may be sufficient further to remark, concerning local observations upon the law of mortality in any metropolis, or in any great commercial city, that the inferences from them are liable to be more or less vitiated, consequently to the population of such places not being equally permanent with that of the country at large. Their population is partially and variously recruited, whether from the surrounding country or from the accession of strangers, whilst a considerable proportion of the individuals born in those cities are subsequently removed; all which circumstances, occurring without constant regularity, may render very inaccurate the generalized deductions from any actual distribution of population, or from any register of Mortality, as regards the Expectation of forthcoming years of life, especially at its early stages.

The *SECOND* Table is a deduction from the first; and it exposes, in the same manner, a comparative statement of the *Expectations* or *Relative averages* of forthcoming years of life, belonging to each age and referable to the different Decrements of life already brought under consideration. This Table has been calculated according to the principle and rule set forth in *Section* XX; and one of its purposes is to facilitate the application of an easy method, described and exemplified in *Section* XXIX, of calculating the value of life-annuities, conformably with any given rate of the Interest of money, and in either case of the instalments of the annuity accruing yearly, half-yearly, or quarterly.

The *THIRD* Table gives the values of Annuities on *single lives*, as deduced from the data supplied by the *first* Table. Those values are calculated upon the principle set forth in *Section* XXVII, and according to a uniform rate of Interest,—that of *four per centum*, understood in a single payment at the expiration of each year. The excessive labour of such calculations has required that the statement of those values, strictly correct, should be confined to a correspondency with the most important systems, only, amongst those previously exposed of the Decrements and Expectations of Life; but even with this limitation, the intelligent reader will find the Table amply sufficient for all practical purposes; and the more so, as other means of comparing the values are abundantly afforded.

The *Northampton* Table being often consulted, although far from offering a fair specimen of the annual decrements of life, we have thought it worth while to re-calculate, with the utmost care, the values of annuities according to that Table of Decrements; extending the results to *five* places of decimals, instead of *three* only, to which those results were limited in all previous calculations*. The correct values of lives are further stated in correspondency with Mr. Duvillard's Law of Mortality accurately observed, respecting the general population of France; and these values, together with the preceding, are brought into a comparative point of view with others supplied from respectable authorities.

From a prevailing ignorance on these matters, innumerable contracts for Life-annuities are entered upon, at variance with equitable principles; and the value of those annuities, commonly, is much underrated, whilst they possess a specific character of convenience that should render them the more valuable for the annuitants themselves.

The *FOURTH* Table gives the values of Annuities supposed to be payable during the *joint continuance* of *two* lives, whether of the same or of different ages; and from various motives, that statement of values has been circumscribed within comparatively narrow limits.

When the value of *three* joint lives is required, it may correctly be found by an ingenious method described by Mr. Morgan, and adverted to by Dr. Price, (*vol.* ii. *page* 211). But a more abridged and easier method of obtaining that value, with tolerable approximation, has been pointed out by Mr. Simpson: it is as follows.—" Let A be the youngest, and C the oldest of the *three* proposed " lives; take the value of the *two* joint lives B and C, and find the *age* of a " single life D of the same value; then find the value of the joint lives A and D, " which will be the answer." Either of those methods may be applied, in correspondency with any Table of the Decrements of Life.

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* The unimportant differences, observable between Mr. Morgan's results and those we have obtained, are satisfactorily accounted for, without impeaching the character of accuracy of either calculations; if (as we apprehend) he has employed logarithms limited to *six* places of decimals, and has further abandoned the decimal parts of his results, when even amounting to a full *half unity* belonging to the last figure retained.

The value of Annuities during *Joint continuance of Life* is but seldom required for direct purposes: it constitutes, however, an indispensable *datum* for establishing the value of Annuities payable during the *longest of any two* or more *lives*, according to the rules stated in *Section* XXXVII; and also for calculating the value of *Reversions*, on the principle exposed in *Section* XXXIX.

References to the last two Tables, and for practical purposes, will not be attended with much inconvenience arising from the uniform rate of Interest applied to all the calculations of which those tables exhibit the results; an easy method of concluding from the value of a Life-annuity, as ascertained according to any one rate, its corresponding value at any other rate of Interest either superior or inferior to the first, having already been supplied in *Section* XXXIV.

The computation of Correct Tables of the *Values of Joint lives*, both of similar and of dissimilar ages, according to comparative systems of Decrements, and to various rates of the Interest of money, would consume the whole life of an expeditious calculator. It has been hitherto executed only partially and piecemeal. There will be no inducement to attempt any thing *complete* of that description, until governments are mindful of the expediency of providing satisfactory data, upon which those laborious calculations may be proceeded.

(XLII.) We may now dismiss the subject of *COMPOUND-INTEREST applied to Transactions affected with Contingency*, after further giving a brief account of those local observations which, at different times and different places, have been made for the purpose of discovering the natural law that governs the gradual waste of human life; and according to which observations the *four Tables* last mentioned have been constructed.

FIRST.—The series of regular observations, earliest recorded, consists in a Register of Mortality for the city of *Breslaw*, in Silesia. That register had been carefully proceeded upon during a whole century, commencing with the year 1633, when Dr. Halley constructed from that source the first known Table of Decrements; but as it is not exempt from error, chiefly produced by a cause already adverted to in the preceding Section (p. 124), that table is seldom referred to at present. It has induced, however, the admission by Mr. Demoivre of a convenient hypothesis respecting the decrements of life. His hypothesis assumes that, out of 86 living persons aged less than *one* accomplished year, a single life annually fails; that of the last survivor being consequently extinct after the accomplishment of the 85th, and before that of the 86th year of his age; thus producing equal decrements for every year throughout that period. From that assumed equality, the *Average* of forthcoming years in Expectation is made exactly to coincide with the *true Probability*, thence inferred, of life at each age; which *Expectation*, therefore, is always considered as *one half* of the difference between the number of accomplished years of any person's life and the supposed term, 86 years, of the longest life; the whole of that difference being taken as the *Complement* of life, which (however suppositious) is one of the requisite data towards calculating by an abridged method the value of Life-annuities, the labour of which calculations may thus be considerably diminished. Although the proportions of annual decrement, as also the averages or expectations of forthcoming years of life, are very defective under Mr. Demoivre's hypothesis, as regards both the earlier and the later stages of life; yet they are acknowledged to correspond with the Decrements and Expectations resulting from the Breslaw observations, relative to the ages comprised between 20 and 70 years or thereabouts, in a sufficient degree for warranting their admission within those limits. A similar correspondency has since been noticed, between the results of admitting that hypothesis and those deduced from the Northampton Observations further mentioned hereafter. But, from the preceding remark, it is obvious that the hypothesis of which we are speaking must be utterly inapplicable towards calculating the values of Reversionary property, depending on survivorship; an exception that has not escaped the sagacity of Dr. Price.

SECOND.—The observations supplied by the Bills of Mortality of London, during the *ten* years ending with 1737, have been the foundation of Mr. Simpson's deductions and calculations, consigned in the works of that celebrated writer. Analogous deductions were afterwards made from the same source of information, during the *ten* years ending with 1768, and again during a similar period ending with the year 1780. The general results, inferred from those three series of observations, are so nearly alike as not to indicate any material alteration in the degree of healthiness of this metropolis, between the first and the last of those periods; in consequence of which, we have preferred, in the construction of the *first* and *second Tables* hereafter, to proceed upon an average of the results of observation, as supplied at those different periods, relatively to each successive year of life.

It has already been remarked by Dr. Price, that the Expectations *(Average)* of Life, as deduced from the London observations, come out generally too high for the first 35 or 40 years; that they are not at all to be depended upon for the first 20 years,—and also that the Bills of Mortality, for *London*, exhibit an instance of constant waste of human life the most rapid at all its stages. The first two circumstances are doubtless ascribable to the great mutability in the population of this metropolis, especially in early life.

THIRD.—From a Register of Mortality instituted for the town of *Northampton*, and correctly kept during a period of 46 years ending with 1780, has been deduced a Table of Decrements considered as one of those most to be relied on for regularity. In its general aspect, it very nearly agrees with the Breslaw observations, and like the latter it affords a specimen of lives rather inferior in quality to the common standard of those in England; whence the Northampton Table is principally adopted in this, and even in other countries, as a safe guide for calculating Life-assurances and Survivorships. It follows that the Expectations of Life, as resulting from that table, are lower than they should appear in consequence of a table of *true decrements* deduced from observations supposed to embrace a more extended selection out of the population of the kingdom at large; and that the values of Life-annuities, stated in the corresponding column of the *third* Table hereafter, could not be indiscriminately admitted in the practice, without probably yielding an undue advantage to Annuitants placed under circumstances more favourable to the protracted duration of life. Numerous tables of various descriptions, and elaborately calculated from the Northampton observations, have been supplied by Mr. Morgan, and inserted in the 2d Volume of Dr. Price's *Observations on Reversionary payments, &c. &c.*

FOURTH.—A specimen, on the contrary, of the best lives susceptible of being brought under observation in England, as averaged from any mass of population not absolutely inconsiderable, has been supplied by *two* other Registers kept in this country. The one through the care of the Rev. Mr. Gorsuch, for the parish of *Holy-cross* (near Shrewsbury), and embracing a period of 20 years, ending with 1770: the other through the care of Dr. Haygarth, for the town of *Chester*, and during the *ten* years terminating with 1781.. The former exhibits rather the best quality of lives; but considering the limited number of the population to which those sets of observations are referable, it has been preferred, in the comparative Tables hereafter, to admit the corresponding deductions at an average of the results produced by each set, relatively to every age of life. It will be sufficient further to remark, that the values of Life-annuities, as deduced from the observations at Chester and Holy-cross, come out generally too high for their indiscriminate application, in the practice, to the common standard of lives: they might, however, be a safe guide for dealing with State-annuitants, until the Government has taken proper measures for being supplied with more correct data, respecting the Law of Mortality amongst that specific class of persons.

FIFTH.—A more eligible medium, perhaps, is instanced by the Bills of Mortality of *Norwich*, from the year 1740 to the year 1769, and by the results of Dr. Aikin's observations on the mortality at *Warrington* (in Lancashire) and its vicinity, from the year 1773 to the year 1781. The average results of those two sets of observations, admitted as a single experiment, are also brought into comparative view in the following Tables.

SIXTH.—An industrious observer and well-informed German writer, Mr. Sussmilch, has supplied, about the middle of the last century, very valuable documents concerning the Mortality and the Decrements of life, in a considerable part of the Prussian dominions. From those data, tables have been constructed, which, as they are extensively used in that country, will also form a branch of the comparative system hereafter exposed. Mr. Sussmilch's Decrements, for *Brandenburgh*, &c., may be considered as applicable to lives of the middling quality.

SEVENTH.—A specimen of the Decrements of life, under general circumstances rather favourable than otherwise to its protracted duration, and deduced from a series of correct observations upon an extensive scale, is afforded by the Registers of Births and of Mortality in *Sueden*. Their results for a period of 45 years, ending with 1776, embrace with very few exceptions the whole population of that kingdom. Mr. Wargentin's scientific reports upon that subject, and in which the circumstances have been attentively discriminated as relating to the *Male* and to the *Female* lives in that country, supply more authentic and satisfactory information concerning human mortality, and concerning the classification of an entire population, than had been obtained from any other quarter until that period. In consequence of distinct returns for the city of *Stockholm* in particular, Dr. Price has made the remark, that "The Tables for Sweden at large, compared with "those for Stockholm the capital, confirm in a very striking manner all that has "been said of the difference between the duration of life in great towns and in "the country."

The proportions of the decrements, resulting from the Swedish observations, might admit some modification, in order to render them quite applicable to countries under a more southern latitude; considering that the progression of mortality, through the different stages of life, is in more or less degree influenced by the climate, even under the supposition of an equality in the absolute average of forthcoming years. The Swedish decrements are, however, and with the confidence to which they are justly entitled, frequently resorted to for calculating the values of annuities on *good lives*; and in our comparative representation of them, the distinction between male and female lives will not be omitted; where it may further be remarked, that the progression of mortality is sensibly less rapid with respect to the latter sex, whose Expectation of life is therefore greater at all ages, as appears indeed to constitute one of Nature's general laws.

EIGHTH.—Whatever general law may govern the gradual waste of human life, in a community of which the members are considered without any distinction of classes or conditions of health, it is evident that such law must be subject to a considerable modification with regard to any particular selection, either of the best, or of the worst lives amongst the whole. Annuitants in general, and especially State-annuitants, may properly be viewed, in all countries, as a select body of the former description; and experience has abundantly proved that the Decrements of life, amongst any collection of annuitants, proceed according to a progression remarkably slow. The progression of those decrements might be ascertained in a very satisfactory degree, as regards this country, if the Government, together with certain incorporated societies to whom much valuable experience has doubtless been imparted, would publish the data they possess. But such information being withheld, the experience of other countries must be consulted, towards supplying the deficiency; and in the first place, there is to notice the Table of Decrements given by Mr. Kersseboom, and deduced from a Register of Mortality kept during 135 consecutive years, with reference to the State-annuitants of both sexes in Holland. Although no distinction is there made, between male and female lives, Mr. Kersseboom has remarked that the female annuitants have, amidst all accidents of age, lived about three or four years longer than the males.

NINTH.—Of the same description with the preceding are the Tables of the Decrements and Probabilities of life amongst the State-annuitants of *France*, as published by Mr. Deparcieux, somewhat less than a century ago. Those tables, and the several deductions from them, may usefully be brought into comparison with the corresponding results inferred from the Dutch-annuitant register.

TENTH and last.—Subsequently to the works of other authors of any note, concerning this general subject, Mr. Duvillard of Geneva published, in the year 1806, some amongst the results of his laborious and scientific researches on the population of France at large. Having been supplied, under government-authority, with adequate means of information, embracing a very extensive portion of the French territory, the statistical data he has been able to collect, together with his deductions from them, are at present, and indisputably, admitted as more correct and exempt from objections than any other documents existing of the same kind. In bringing into view the results of Mr. Duvillard's researches, comparatively with those noticed in the foregoing paragraphs, there are sufficient grounds for assuming that they exhibit a very fair specimen of the law of Mortality indiscriminately applicable to the kingdom of France, such as it existed previously to the year 1790; and it is probable that, were our institutions in England such as to afford local information equally authentic and extensive on the same subject, very little difference would be found to exist between the two progressions, expressive of the Decrements of human life for the one country and for the other.

The correctness of Mr. Duvillard's Decrements of Life may the more be relied on, as he has applied to them a very ingenious method of rectifying the inaccuracies with which an assumed Law of Mortality, derived from any course of observations, will probably be tainted, consequently to the casual character of the events observed in limited number. His method reduces the general expression of a correct Law of Mortality to that of a *Parabolic curve;* in the equation of which the *Ordinates* represent the quantities of the living, at the respective ages represented by the *Abscissa.* Without such previous rectification of any Table deduced from actual Observations, even a tolerable approach to accuracy in the ultimate results, referable to very advanced years, and expressing the Expectations of life, together with the values of Life-annuities, could only in vain be expected. In fact, Mr. Duvillard's Table of Decrements, is the only one in existence that may, in any degree, be depended upon for that purpose.

END OF THE SECOND PART.

TABLE (No. I.), exhibiting the *Decrements of Life* from year to year, and the *Quantities of living persons of each age*, in proportion with certain assumed *totals of population*; according to observations collected in different parts of Europe, relatively to various circumstances of human existence, and the results of those observations accommodated—for the purpose of comparison—to a uniform *radix*, of 10,000 individuals supposed to exist each of *five* accomplished years of age, when the *Expectation* of life is generally at its *maximum*; this TABLE also exhibiting, with reference to each age, the *Probability of life's enduring until any other specific age*; such probability expressed by a *fraction*, of which the *numerator* is the quantity of the living at the latter age, and of which the *denominator* is the quantity of the living at the age departed from.

Accomplished years of age.	State-Annuitants of France.	Female population of Sweden.	General population of Sweden.	Male population of Sweden.	Chester and Holy-Cross.	State-Annuitants of Holland.	General population of France.	Norwich and Warrington.	Brandenburgh.	Northampton.	Breslaw.	London Bills of Mortality.
0	15461	15022	15235	15449	16031	14523	17148.22	20395	15887	18643	17201	22561
1	11518	11882	11891	11896	12969	11670	13161.68	15172	12567	13842	13661	15362
2	10959	11104	11115	11123	11722	11151	11520.76	12313	11426	11655	11680	12574
3	10549	10578	10591	10602	10912	10685	10711.95	11110	10796	10851	10902	11363
4	10232	10203	10218	10232	10377	10301	10266.83	10440	10365	10315	10383	10549
5	10000	10000	10000	10000	10000	10000	10000.00	10000	10000	10000	10000	10000
6	9810	9820	9814	9807	9718	9824	9826.36	9666	9685	9706	9699	9664
7	9652	9662	9654	9645	9504	9647	9703.11	9453	9453	9482	9454	9404
8	9515	9534	9522	9506	9349	9471	9607.20	9282	9287	9305	9290	9219
9	9389	9429	9410	9390	9253	9378	9525.60	9139	9154	9177	9153	9064
10	9283	9339	9316	9289	9182	9284	9450.75	9020	9071	9081	9030	8942
11	9193	9261	9234	9204	9126	9191	9378.16	8923	9005	8998	8921	8825
12	9117	9192	9165	9135	9079	9108	9305.14	8833	8939	8918	8825	8708
13	9051	9132	9101	9065	9031	9025	9230.03	8748	8872	8838	8743	8596
14	8990	9079	9043	9004	8980	8952	9152.18	8667	8806	8758	8661	8490
15	8933	9027	8987	8942	8927	8880	9070.88	8587	8740	8678	8579	8388
16	8875	8974	8931	8882	8871	8807	8986.01	8506	8673	8598	8497	8287
17	8811	8914	8870	8821	8800	8734	8897.57	8418	8607	8513	8415	8180
18	8743	8854	8809	8761	8725	8662	8805.65	8322	8541	8421	8333	8074
19	8670	8791	8745	8693	8646	8568	8710.42	8222	8474	8320	8251	7966
20	8593	8726	8679	8625	8569	8475	8612.11	8126	8408	8213	8169	7858
21	8513	8662	8608	8548	8486	8382	8510.95	8025	8325	8097	8087	7749
22	8431	8597	8536	8471	8403	8299	8407.21	7928	8242	7977	8005	7632
23	8347	8532	8463	8393	8318	8216	8301.15	7827	8159	7857	7910	7514
24	8262	8466	8390	8308	8223	8122	8193.02	7727	8076	7737	7828	7388
25	8176	8399	8314	8223	8126	8008	8083.09	7626	7993	7617	7746	7261
26	8088	8331	8237	8138	8019	7884	7971.58	7518	7894	7497	7650	7134
27	7998	8256	8158	8053	7912	7749	7858.72	7401	7794	7377	7555	7008
28	7910	8176	8076	7968	7805	7624	7744.73	7280	7695	7257	7469	6878
29	7823	8095	7992	7884	7699	7500	7629.78	7159	7595	7137	7363	6736
30	7738	8013	7908	7800	7596	7376	7514.06	7047	7496	7017	7254	6594
31	7655	7922	7818	7706	7509	7251	7397.70	6943	7396	6897	7145	6449
32	7571	7832	7727	7613	7424	7127	7280.84	6834	7297	6777	7036	6305
33	7489	7735	7633	7520	7337	7002	7163.57	6730	7197	6657	6926	6160
34	7409	7637	7537	7428	7242	6898	7045.96	6621	7098	6537	6817	6013
35	7328	7539	7441	7335	7147	6795	6928.08	6513	6998	6417	6694	5866
36	7248	7449	7351	7242	7048	6691	6809.95	6401	6882	6297	6571	5719
37	7169	7365	7262	7150	6949	6587	6691.56	6285	6766	6177	6448	5571
38	7092	7281	7174	7057	6848	6483	6572.91	6165	6650	6057	6325	5424
39	7016	7197	7086	6964	6747	6380	6453.96	6045	6534	5937	6202	5270
40	6942	7110	6994	6872	6642	6276	6334.62	5921	6418	5817	6079	5107
41	6866	7012	6895	6771	6537	6183	6214.83	5805	6302	5695	5956	4950
42	6790	6900	6784	6660	6429	6089	6094.47	5689	6186	5572	5833	4785
43	6713	6785	6665	6536	6322	5996	5973.44	5576	6070	5447	5697	4620
44	6634	6671	6545	6413	6207	5902	5851.57	5459	5954	5322	5560	4463
45	6554	6559	6427	6289	6090	5809	5728.74	5343	5837	5198	5423	4305
46	6472	6450	6312	6166	5972	5706	5604.78	5230	5721	5073	5287	4150
47	6388	6350	6199	6042	5855	5602	5479.52	5124	5605	4948	5150	3996
48	6303	6252	6080	5918	5738	5498	5352.79	5023	5489	4823	5014	3840
	412269	418098	414951	411539	408401	397770	406464.19	394587	400445	389530	392807	376960

TABLE (No. I.)—*continued.*

Accomplished years of Age.	State-Annuitants of France.	Female population of Sweden.	General population of Sweden.	Male population of Sweden.	Chester and Holy-Cross.	State-Annuitants of Holland.	General population of France.	Norwich and Warrington.	Brandenburgh.	Northampton.	Breslaw.	London Bills of Mortality.
	412269	418098	414951	411539	408401	397770	406264.19	394567	400445	389530	392807	376960
49	6217	6154	5978	5795	5616	5873	5224.41	4917	5373	4698	4877	3698
50	6129	6049	5859	5664	5497	5259	5094.21	4812	5257	4572	4727	3558
51	6037	5937	5730	5517	5378	5135	4962.03	4699	5124	4442	4576	3418
52	5942	5816	5597	5370	5260	5000	4827.69	4586	4992	4311	4426	3278
53	5840	5689	5460	5223	5143	4876	4691.06	4465	4859	4180	4276	3143
54	5731	5561	5323	5076	5018	4751	4552.00	4336	4710	4049	4126	3014
55	5614	5433	5184	4930	4895	4627	4410.40	4200	4561	3917	3989	2887
56	5489	5306	5046	4783	4776	4502	4266.17	4063	4395	3786	3852	2763
57	5357	5178	4906	4636	4657	4367	4119.25	3926	4229	3655	3716	2638
58	5221	5043	4761	4482	4530	4232	3969.61	3789	4063	3524	3579	2523
59	5092	4908	4616	4327	4399	4098	3817.28	3648	3881	3393	3443	2408
60	4934	4757	4464	4173	4263	3963	3662.29	3508	3698	3261	3306	2289
61	4780	4592	4299	4011	4112	3828	3504.76	3363	3516	3130	3169	2169
62	4623	4415	4126	3841	3944	3693	3344.83	3219	3333	2999	3033	2058
63	4460	4235	3946	3663	3776	3558	3182.72	3066	3151	2869	2896	1946
64	4295	4054	3766	3485	3607	3413	3018.69	2913	2968	2740	2760	1834
65	4126	3874	3586	3308	3452	3268	2853.08	2756	2786	2612	2623	1722
66	3956	3694	3406	3130	3312	3122	2686.28	2595	2604	2484	2486	1613
67	3786	3514	3227	2952	3175	2977	2518.76	2439	2421	2356	2350	1504
68	3612	3333	3042	2767	3042	2832	2351.06	2282	2239	2228	2213	1395
69	3437	3153	2853	2574	2907	2687	2183.78	2129	2056	2100	2076	1296
70	3261	2973	2665	2381	2760	2541	2017.58	1976	1874	1972	1940	1196
71	3081	2778	2471	2188	2596	2396	1853.21	1823	1708	1843	1790	1103
72	2897	2567	2262	1994	2410	2251	1691.44	1679	1542	1715	1639	1011
73	2704	2342	2063	1809	2224	2106	1533.12	1534	1376	1587	1489	919
74	2500	2102	1849	1624	2040	1961	1379.11	1390	1211	1459	1339	840
75	2287	1876	1651	1454	1868	1815	1230.30	1249	1061	1331	1202	764
76	2067	1666	1467	1292	1718	1660	1087.61	1108	929	1203	1066	688
77	1852	1471	1292	1137	1577	1504	951.92	976	813	1080	929	614
78	1645	1290	1132	998	1439	1340	824.08	852	713	963	792	540
79	1447	1125	987	867	1302	1193	704.91	736	614	855	669	482
80	1255	975	850	743	1167	1037	595.13	632	531	751	560	384
81	1078	832	713	627	1032	902	495.35	542	448	650	464	335
82	912	697	585	519	904	778	406.07	475	381	554	383	287
83	761	569	471	419	779	664	327.64	407	315	462	314	244
84	625	449	372	326	656	571	260.23	339	265	374	260	202
85	506	336	288	249	541	467	203.81	288	216	298	205	175
86	404	254	219	187	441	373	158.18	237	182	232	150	138
87	318	194	166	141	358	290	122.87	186	149	178	109	109
88	246	149	125	107	280	218	97.23	153	116	133	68	82
89	181	114	94	80	234	156	80.35	119	99	99	41	65
90	124	87	72	59	188	104	65.68	85	83	74	14	49
91	77	65	50	40	149	73	53.05	51	66	54	..	40
92	43	47	32	26	119	52	42.29	17	29	38	..	31
93	22	32	17	15	89	31	33.24	17	22	26	..	23
94	9	20	8	6	61	21	25.71	..	18	14	..	17
95	4	11	3	2	32	10	19.55	..	14	6	..	12
96	2	5	2	..	16	6	14.58	..	9	2	..	7
97	..	2	..	..	4	5	10.64	..	4	..	..	3
98	..	..	..	..	..	4	7.59	..	2	..	..	1
99	..	..	..	..	..	2	5.27	..	1	..	..	..
100	..	..	..	..	..	..	3.55	..	1	..	..	..
101	..	..	..	..	..	..	2.31	..	..	..	..	..
102	..	..	..	..	..	..	1.45	..	..	..	..	..
103	..	..	..	..	..	..	0.87	..	..	..	..	..
104	..	..	..	..	..	..	0.49	..	..	..	..	..
105	..	..	..	..	..	..	0.27	..	..	..	..	..
106	..	..	..	..	..	..	0.13	..	..	..	..	..
107	..	..	..	..	..	..	0.06	..	..	..	..	..
108	..	..	..	..	..	..	0.03	..	..	..	..	..
109	..	..	..	..	..	..	0.01	..	..	..	..	..
Totals	547244	543821	532038	520536	526144	507871	501811.46	487169	495453	478789	480789	438475

TABLE (No. II.), exhibiting with reference to each age the *Average of forthcoming years*, commonly called *Expectation of Life*, as deduced from each set of observations respecting the annual *Decrements of the Living*; with the addition of those Expectations according to Mr. Demoivre's hypothesis of equal decrements.

N. B.—The *true Expectation*, or *Probable term of life*, is the quantity of years after which the living, at any specific age, will be reduced precisely to *one half* their number, according to the progression of Decrements that may be adopted, as a natural law, amongst the different progressions set forth in the preceding Table; the probabilities being equal, either for or against the event of any person of that age continuing alive beyond such term. But these *Averages* are important *data*, towards calculating the value of life-annuities, by an abridged method of approximation.

Accomplished years of age.	State-annuitants of France.	Female population of Sweden.	General population of Sweden.	Male population of Sweden.	Chester and Holy-Cross.	State-annuitants of Holland.	Population of France.	Norwich and Warrington.	Brandenburgh.	Northampton.	Demoivre's hypothesis.	Breslaw.	London Bills of Mortality.
0	34.896	35.702	34.423	33.194	32.314	34.470	28.7632	23.386	30.686	25.182	43.	27.452	18.935
1	45.669	44.003	42.963	41.960	38.827	41.774	36.3499	30.266	37.600	32.743	42.5	33.435	26.574
2	46.975	46.052	44.925	43.839	41.904	42.694	40.4253	36.177	40.369	37.794	42.	38.020	31.355
3	47.780	47.316	46,125	44.967	43.977	43.538	42.4409	39.039	41.697	39.555	41.5	39.701	33.646
4	48.245	48.039	46.790	45.579	45.216	44.141	43.2591	40.512	42.416	40.585	41.	40.661	35.202
5	48.352	48.003	46.798	45.623	45.904	44.454	43.4002	41.273	42.939	40.849	40.5	41.197	36.107
6	48.280	47.875	46.675	45.512	46.222	44.243	43.1583	41.684	43.320	41.073	40.	41.458	36.346
7	48.061	47.648	46.446	45.269	46.249	44.043	42.7001	41.609	43.372	41.051	39.5	41.523	36.335
8	47.748	47.280	46.080	44.924	46.007	43.853	42.1215	41.368	43.133	40.798	39.	41.247	36.055
9	47.379	46.801	45.619	44.472	45.483	43.289	41.4780	41.008	42.755	40.360	38.5	40.855	35.663
10	46.917	46.259	46.076	43.947	44.829	42.715	40.8025	40.540	42.142	39.762	38.	40.405	35.143
11	46.370	45.634	44.473	43.348	44.103	42.144	40.1155	39.978	41.448	39.145	37.5	39.894	34.602
12	45.751	44.973	43.802	42.674	43.326	41.524	39.4254	39.377	40.752	38.492	37.	39.320	34.059
13	45.084	44.266	43.107	41.998	42.556	40.901	38.7419	28.756	40.053	37.836	36.5	38.684	33.496
14	44.383	43.520	42.379	41.282	41.793	40.229	38.0674	38.113	39.351	37.177	36.	38.046	32.910
15	43.664	42.770	41.642	40.564	41.036	39.553	37.4041	37.466	38.646	36.515	35.5	37.404	32.303
16	42.949	42.018	40.902	39.836	40.295	38.875	36.7507	36.817	37.938	35.850	35.	36.760	31.691
17	42.255	41.298	40.179	39.105	39.616	38.194	36.1130	36.198	37.226	35.202	34.5	36.114	31.098
18	41.580	40.574	39.454	38.370	38.952	37.510	35.4839	35.610	36.512	34.585	34.	35.464	30.502
19	40.924	39.862	38.739	37.666	38.303	36.914	34.8672	35.037	35.794	33.998	33.5	34.811	29.908
20	40.288	39.153	38.027	36.959	37.643	36.315	34.2596	34.445	35.072	33.435	33.	34.156	29.312
21	39.663	38.442	37.340	36.289	37.006	35.714	33.6562	33.873	34.416	32.904	32.5	33.497	28.717
22	39.044	37.727	36.649	35.603	36.366	35.066	33.0700	33.279	33.758	32.391	32.	32.834	28.150
23	38.430	37.009	35.961	34.938	35.732	34.415	32.4861	32.700	33.099	31.878	31.5	32.225	27.585
24	37.820	36.294	35.270	34.290	35.139	33.805	31.9082	32.190	32.430	31.365	31.	31.558	27.045
25	37.215	35.582	34.589	33.640	34.552	33.279	31.3354	31.538	31.761	30.851	30.5	30.886	26.509
26	36.615	34.866	33.904	32.986	34.008	32.797	30.7668	30.985	31.155	30.337	30.	30.266	25.971
27	36.020	34.179	33.228	32.328	33.462	32.359	30.2014	30.466	30.547	29.823	29.5	29.643	25.433
28	35.415	33.501	32.562	31.668	32.915	31.879	29.6386	29.963	29.935	29.308	29.	29.016	24.902
29	34.802	32.838	31.898	31.004	32.358	31.400	29.0776	29.460	29.321	28.792	28.5	28.387	24.416
30	34.179	32.170	31.231	30.330	31.791	30.935	28.5177	28.921	28.704	28.276	28.	27.807	23.932
31	33.547	31.531	30.584	29.695	31.153	30.444	27.9584	28.349	28.083	27.759	27.5	27.225	23.458
32	32.911	30.888	29.953	29.050	30.504	29.967	27.3991	27.790	27.459	27.242	27.	26.640	22.984
33	32.266	30.272	29.304	28.402	29.861	29.491	26.8395	27.214	26.832	26.724	26.5	26.052	22.512
34	31.613	29.653	28.671	27.750	29.244	28.927	26.2791	26.651	26.201	26.206	26.	25.462	22.051
35	30.952	29.030	28.034	27.095	28.623	28.361	25.7177	26.086	25.566	25.687	25.5	24.920	21.591
36	30.289	28.375	27.371	26.435	28.022	27.793	25.1552	25.535	24.989	25.167	25.	24.377	21.134
37	29.617	27.694	26.698	25.771	27.414	27.232	24.5914	24.997	24.409	24.647	24.5	23.833	20.679
38	28.934	27.008	26.021	25.130	26.811	26.681	24.0263	24.473	23.827	24.124	24.	23.286	20.227
39	28.241	26.318	25.339	24.431	26.205	26.075	23.4599	23.949	23.241	23.602	23.5	22.738	19.805
40	27.538	25.634	24.663	23.753	25.612	25.498	22.8924	23.443	22.652	23.079	23.	22.188	19.418
41	26.836	24.984	24.010	23.098	25.017	24.875	22.3240	22.900	22.061	22.561	22.5	21.635	19.020
42	26.130	24.384	23.396	22.476	24.426	24.249	21.7550	22.357	21.465	22.049	22.	21.088	18.658
43	25.425	23.786	22.804	21.891	23.832	23.619	21.1857	21.797	20.866	21.542	21.5	20.574	18.307
44	24.722	23.184	22.212	21.303	23.265	22.985	20.6165	21.253	20.263	21.036	21.	20.068	17.935
45	24.019	22.574	21.615	20.712	22.703	22.346	20.0478	20.707	19.656	20.529	20.5	19.560	17.573
46	23.316	21.944	20.998	20.117	22.139	21.743	19.4802	20.143	19.045	20.022	20.	19.053	17.210
47	22.615	21.284	20,370	19.687	21.673	21.136	18.9140	19.547	18.429	19.514	19.5	18.545	16.858
48	21.913	20.609	19.728	18.916	21.003	20.526	18.3500	18.942	17.808	19.006	19.	18.037	16.518

Accomplished years of age.	State-annuitants of France.	Female population of Sweden.	General population of Sweden.	Male population of Sweden.	Chester and Holy-Cross.	State-annuitants of Holland.	Population of France.	Norwich and Warrington.	Brandenburgh.	Northampton.	Demoivre's hypothesis.	Breslaw.	London Bills of Mortality.
49	21.211	19.928	19.086	18.309	20.446	19.990	17.7886	18.327	17.182	18.498	18.5	17.528	16.134
50	20.599	19.266	18.463	17.721	19.879	19.413	17.2305	17.717	16.560	17.996	18.	17.069	15.752
51	19.828	18.621	17.869	17.180	19.309	18.871	16.6762	17.131	15.966	17.506	17.5	16.613	15.376
52	19.123	17.979	17.280	16.635	18.729	18.367	16.1263	16.541	15.377	17.024	17.	16.161	15.010
53	18.448	17.389	16.702	16.089	18.144	17.823	15.5814	15.974	14.783	16.542	16.5	15.715	14.631
54	17.787	16.776	16.119	15.540	17.581	17.277	15.0421	15.435	14.236	16.062	16.	15.265	14.239
55	17.149	16.159	15.537	14.987	17.014	16.728	14.5090	14.922	13.685	15.584	15.5	14.771	13.843
56	16.529	15.536	14.950	14.432	16.426	16.177	13.9827	14.407	13.183	15.106	15.	14.277	13.443
57	15.922	14.906	14.363	13.873	15.833	15.661	13.4635	13.892	12.680	14.631	14.5	13.783	13.053
58	15.324	14.293	13.784	13.334	15.263	15.144	12.9522	13.376	12.178	14.157	14.	13.290	12.628
59	14.700	13.673	13.201	12.792	14.703	14.626	12.4491	12.872	11.727	13.685	13.5	12.798	12.204
60	14.156	13.081	12.634	12.247	14.154	14.167	11.9548	12.368	11.280	13.216	13.	12.306	11.815
61	13.593	12.542	12.098	11.722	13.657	13.586	11.4697	11.878	10.840	12.749	12.5	11.815	11.438
62	13.040	12.025	11.587	11.219	13.218	13.064	10.9942	11.389	10.406	12.285	12.	11.324	11.032
63	12.526	11.516	11.092	10.739	12.784	12.540	10.5287	10.932	9.979	11.817	11.5	10.835	10.637
64	11.961	11.005	10.597	10.261	12.357	12.052	10.0737	10.480	9.561	11.353	11.	10.347	10.256
65	11.429	10.494	10.104	9.785	11.892	11.566	9.6294	10.046	9.155	10.885	10.5	9.859	9.888
66	10.899	9.982	9.610	9.312	11.371	11.080	9.1962	9.638	8.761	10.420	10.	9.374	9.523
67	10.370	9.468	9.118	8.842	10.840	10.596	8.7746	9.226	8.384	9.959	9.5	8.890	9.178
68	9.813	8.953	8.640	8.401	10.325	10.114	8.3648	8.825	8.026	9.503	9.	8.407	8.858
69	9.318	8.437	8.179	7.994	9.781	9.634	7.9673	8.423	7.694	9.052	8.5	7.923	8.498
70	8.795	7.918	7.724	7.602	9.276	9.156	7.5824	8.037	7.394	8.607	8.	7.461	8.161
71	8.278	7.439	7.289	7.229	8.834	8.681	7.2106	7.669	7.063	8.170	7.5	7.034	7.808
72	7.772	7.008	6.896	6.880	8.473	8.208	6.8524	7.286	6.769	7.743	7.	6.633	7.476
73	7.291	6.634	6.533	6.534	8.141	7.740	6.5084	6.926	6.524	7.329	6.5	6.252	7.170
74	6.846	6.336	6.229	6.223	7.841	7.276	6.1794	6.595	6.349	6.925	6.	5.898	6.796
75	6.438	6.036	5.916	5.892	7.506	6.818	5.8663	6.280	6.172	6.543	5.5	5.511	6.425
76	6.068	5.735	5.597	5.570	7.117	6.411	5.5703	6.013	5.982	6.186	5.	5.154	6.083
77	5.714	5.431	5.288	5.258	6.710	6.022	5.2931	5.760	5.765	5.835	4.5	4.838	5.755
78	5.371	5.119	4.964	4.921	6.302	5.659	5.0366	5.599	5.500	5.482	4.	4.586	5.471
79	5.037	4.799	4.619	4.591	5.914	5.332	4.8035	5.322	5.311	5.116	3.5	4.337	5.077
80	4.730	4.460	4.283	4.271	5.541	5.057	4.5974	5.114	5.063	4.756	3.	4.085	*5.242
81	4.428	4.139	4.011	3.968	5.202	4.738	4.4228	4.875	4.908	4.416	2.5	3.824	4.936
82	4.140	3.845	3.779	3.690	4.864	4.416	4.2853	4.500	4.674	4.095	2	3.536	4.675
83	3.865	3.595	3.574	3.456	4.565	4.089	4.1914	4.167	4.553	3.805	1.5	3.196	4.419
84	3.599	3.423	3.393	3.296	4.328	3.676	4.1476	3.900	4.313	3.581	1.	2.763	4.231
85	3.328	3.402	3.235	3.165	4.141	3.382	*4.1572	3.500	4.193	3.376	0.5	2.367	3.796
86	3.043	3.346	3.090	3.045	3.973	3.103	4.2123	3.143	3.864	3.190	..	2.045	3.677
87	2.722	3.229	2.922	2.885	3.771	2.846	4.2790	2.864	3.612	3.013	..	1.625	3.523
88	2.379	3.056	2.719	2.645	3.685	2.629	4.2756	2.389	3.500	2.861	..	1.300	3.520
89	2.054	2.829	2.435	2.346	3.315	2.480	4.0688	1.929	3.001	2.661	..	0.833	3.334
90	1.773	2.552	2.053	2.026	3.008	2.470	3.8661	1.560	2.501	2.413	..	0.500	3.226
91	1.536	2.208	1.712	1.731	2.650	2.314	3.6675	1.167	2.001	2.088	..	..	2.827
92	1.350	1.952	1.405	1.383	2.196	2.040	3.4053	*1.500	1.501	1.750	..	..	2.526
93	1.200	1.643	1.227	1.000	1.775	*2.067	3.2831	0.500	1.501	1.375	..	..	2.200
94	1.134	1.346	1.101	0.749	1.369	1.849	3.0975	..	0.999	1.056	..	..	1.818
95	0.858	1.071	0.998	0.500	1.127	2.200	2.9164	..	0.999	0.750	..	..	1.434
96	0.526	0.833	0.500	..	0.754	2.334	2.7401	..	0.500	0.500	..	..	1.056
97	..	0.500	..	..	0.500	1.698	2.5683	..	..	..	..	..	0.752
98	..	..	..	..	..	1.000	2.4024	..	..	..	..	..	0.500
99	..	..	..	..	..	0.500	2.2398	..	..	..	..	..	..
100	..	..	..	..	..	..	2.0637	..	..	..	..	..	..
101	..	..	..	..	..	..	1.9331	..	..	..	..	..	..
102	..	..	..	..	..	..	1.7883	..	..	..	..	..	..
103	..	..	..	..	..	..	1.6506	..	..	..	..	..	..
104	..	..	..	..	..	..	1.5174	..	..	..	..	..	..
105	..	..	..	..	..	..	1.3902	..	..	..	..	..	..
106	..	..	..	..	..	..	1.2692	..	..	..	..	..	..
107	..	..	..	..	..	..	1.1607	..	..	..	..	..	..
108	..	..	..	..	..	..	1.1000	..	..	..	..	..	..
109	..	..	..	..	..	..	1.0000	..	..	..	..	..	..

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* The decreasing progression of the *Expectations* appears sometimes interrupted, with regard to the later stages of life. In the *London* lives, it arises from a limitation to the 79th year, of the observations on the Bills of Mortality from 1728 to 1737; whence the Decrements in the preceding Table, for the ages of 80 and upwards, are stated on an average of two subsequent periods only, and also of 10 years each. The probable cause of this irregularity in two other instances, those of the *Norwich* lives and of the *Dutch Annuitants*, is the very small number of lives exceeding 92 and 93 years, to which the observations were necessarily confined; but a similar irregularity as to the *Population of France*, for the ages of 85, 86, 87 and 88, must be otherwise accounted for, the correctness of Mr. Duvillard's calculations being fully ascertained. It is not unlikely that the comparatively few whose lives extend to 85 years, or thereabouts, may be indebted for this distinction to specific causes subsequently continuing in operation, so as to afford those persons a better security of life, at least during a small number of years, than is possessed by the generality of individuals existing at even less advanced ages.

TABLE (No. III.)—Of the VALUES of ANNUITIES on SINGLE LIVES, at each age, according to various systems of the *Decrements* and *Probabilities of Life* as stated in TABLE No. I.; those values expressed by quantities of *Years' Purchase*, and ascertained upon the principles referred to in *Section* XXVII.; admitting as a *Standard Rate* of *Perpetual Interest* that of *four per centum*, to accrue by *full yearly* instalments,—and the Annuity to be payable *at the expiration of each successive year*, until the last accomplished previously to the demise of the annuitant.

Accomplished years of Age.	State-Annuitants of France.	Female population of Sweden.	Male population of Sweden.	General population of France.	According to the Northampton Register.	According to Mr. Demoivre's hypothesis.	According to the London Register, 1728 to 1737.
0	...	...	...	11.61829	10.32794	...	...
1	...	16.820	16.503	14.74285	13.46627	...	...
2	...	17.719	17.355	16.51642	15.63361	...	...
3	18.24246	18.344	17.935	17.47403	16.46262	...	...
4	18.55893	18.780	18.328	17.96071	17.01059	...	...
5	18.74921	18.927	18.503	18.17773	17.24906	...	...
6	18.87658	19.045	18.622	18.23890	17.48276	...	16.2
7	18.95347	19.131	18.693	18.20941	17.61222	...	16.3
8	18.99571	19.162	18.725	18.12684	17.66320	16.791	16.4
9	19.02190	19.151	18.715	18.01340	17.62599	16.882	16.4
10	19.00758	19.109	18.674	17.88230	17.52522	16.882	16.4
11	18.94924	19.041	18.600	17.74155	17.39440	16.791	16.4
12	18.84375	18.952	18.491	17.59600	17.25244	16.698	16.3
13	18.73423	18.840	18.378	17.44876	17.10497	16.604	16.2
14	18.62049	18.707	18.246	17.30112	16.95169	16.508	16.
15	18.50233	18.568	18.105	17.15438	16.79229	16.410	15.8
16	18.37954	18.424	17.958	17.00904	16.62651	16.311	15.6
17	18.27496	18.290	17.803	16.86524	16.46382	16.209	15.4
18	18.16664	18.151	17.643	16.72295	16.31112	16.105	15.2
19	18.05439	18.013	17.492	16.58201	16.16912	15.999	15.
20	17.93804	17.872	17.335	16.44214	16.03543	15.891	14.8
21	17.84073	17.725	17.192	...	15.91414	15.781	14.7
22	17.74037	17.573	17.042	...	15.79966	15.669	14.5
23	17.63682	17.414	16.887	...	15.68269	15.554	14.3
24	17.52994	17.252	16.742	...	15.56300	15.437	14.1
25	17.41957	17.087	16.592	15.74696	15.44054	15.318	14.
26	17.30556	16.915	16.436	...	15.31518	15.197	13.8
27	17.18773	16.751	16.274	...	15.18697	15.073	13.6
28	17.06591	16.588	16.105	...	15.05549	14.946	13.4
29	16.93990	16.427	15.930		14.92119	14.816	13.2
30	16.80952	16.261	15.751	15.02106	14.78350	14.684	13.1
31	16.67454	16.104	15.575	...	14.64234	14.549	12.9
32	16.53474	15.941	15.395	...	14.49771	14.411	12.7
33	16.38989	15.787	15.208	...	14.34946	14.270	12.6
34	16.23973	15.629	15.014	...	14.19742	14.126	12.4
35	16.08401	15.465	14.812	14.21380	14.04148	13.979	12.3
36	15.92245	15.278	14.601	...	13.88147	13.829	12.1
37	15.75474	15.070	14.382	...	13.71724	13.676	11.9
38	15.55586	14.854	14.154	...	13.54860	13.519	11.8
39	15.34864	14.629	13.916	...	13.37541	13.359	11.6
40	15.13266	14.401	13.668	13.28559	13.19743	13.196	11.5
41	14.90746	14.185	13.426	...	13,01842	13.028	11.4
42	14.67254	13.994	13.196	...	12.83904	12.858	11.2
43	14.42739	13.798	12.984	...	12.65804	12.683	11.1
44	14.17147	13.596	12.763	...	12.47260	12.504	11.

Accomplished years of Age.	State-Annuitants of France.	Female population of Sweden.	Male population of Sweden.	General population of France.	According to the Northampton Register.	According to Mr. Demoivre's hypothesis.	According to the London Register, 1728 to 1737.
45	13.90419	13.383	12.535	12.21762	12.28355	12.322	10 8
46	13.62495	13.151	12.297	...	12 08921	12.135	10.7
47	13.35670	12.894	12.051	...	11.88995	11.944	10.5
48	13.07649	12.620	11 795	...	11 68556	11.748	10.4
49	12.80700	12.333	11.528	...	11.47585	11.548	10 2
50	12.52560	12.049	11.267	11.02642	11.26490	11.344	10 1
51	12.25477	11.769	11.030	10.76184	11.05734	11.135	9 9
52	11.99530	11.492	10.785	10.50375	10 84966	10.921	9.8
53	11.72507	11.220	10 531	10.24205	10.63788	10 702	9.6
54	11.44340	10.937	10.269	9.97514	10.42197	10.478	9.4
55	11.17264	10 642	9.998	9.70936	10.20191	10.248	9.3
56	10.89082	10.334	9.717	9.43912	9.97771	10.014	9.1
57	10.59721	10.012	9.425	9.16682	9.74937	9.773	8.9
58	10.31409	9.692	9.140	8.89286	9.51692	9.527	8 7
59	10.01961	9.358	8.845	8.61766	9.28043	9·275	8.6
60	9.71298	9.039	8 540	8.34165	9.03998	9.017	8 4
61	9.39332	8 739	8.241	8.06525	8.79572	8.753	8.2
62	9.05966	8.453	7.950	7.78882	8.54781	8.482	8.1
63	8.73389	8.166	7.669	7.51307	8.29132	8.205	7.9
64	8.39417	7.870	7.382	7.23816	8.03096	7.921	7.7
65	8.03935	7.566	7.090	6.96465	7.76161	7.631	7.5
66	7.69096	7.252	6.792	6.69298	7.48817	7.333	7 3
67	7.35019	6.930	6.489	6.42364	7.21094	7.027	7 1
68	7.01869	6.596	6.201	6.15723	6.93037	6.714	6.9
69	6.69280	6.253	5.933	5.89566	6.64708	6 394	6.7
70	6.39375	5.897	5.670	5.63459	6.36185	6.065	6.5
71	6 08366	5.564	5.418	5.37974	6.07580	5 728	6.3
72	5.79394	5.261	5.180	5.13002	5.79038	5.383	6.1
73	5.50583	4.998	4.940	4.88619	5.50764	5.029	5.9
74	5.22183	4.792	4 724	4.64912	5.23040	4.666	5 6
75	4.94546	4.582	4.487	4.41988	4.96265	4.293	5 4
76	4.65225	4.367	4.253	4 19975	4.71022	3.912	...
77	4.36972	4·145	4.024	3.99034	4 45743	3.520	...
78	4.10620	3.913	3.768	3.79371	4.19787	3.111	...
79	3.83448	3.668	3.512	3.61249	3.92173	2.707	...
80	3.59617	3.402	3.260	3.45006	3.64386	2.284	...
81	3.36953	3.145	3.017	3 31080	3.37766	1.850	...
82	3.16395	2.905	2.792	3.20026	3.12192	1.406	...
83	2.93934	2.699	2.600	3.12498	2.88716	0.950	...
84	2.67866	2.559	2.473	3.09187	2.70840	0.481	...
85	2.42422	2.552	2.371	*3.10564	2.54364	...	...
86	2.18465	2.518	2.281	*3.16162	2.39339	...	...
87	1.97716	2.431	2.154	*3.23293	2 25156	...	...
88	1.71050	2.294	1.955	*3.24895	2 13157	...	...
89	1.44602	2.108	1.698	3.08870	1.96769		
90	1.18743	1.873	1.417	2.92992	1.75819		
91	0 94061	1.628	1 154	2.77258	1.47388		
92	0 71191	1.349	0.835	2.61678	1.17152		
93	0.48077	1.071	0.477	2.46296	0.82703		
94	...	0.799	0.240	2.31109	0.53008		
95	...	0.544	...	2.16129	0 24038		
96	...	0.320	...	2.01390	...		

Age	*Continued*, for the populat. of France
97	1.86887
98	1.72697
99	1.58733
100	1.45149
101	1.31928
102	1.19073
103	1.06720
104	0.94615

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* This interruption of the decreasing values is accounted for in a note to the preceding page.

(*N. B.*)—When the rate of *Interest* is other than 4 *per Cent.* the difference in value is ascertainable by the rule given in *Section* XXXIV.

TABLE (No. IV.), of the VALUES OF ANNUITIES during the *Joint continuance of two lives*, according to various systems of the Decrements and Probabilities of Life as stated in TABLE No. I. those values expressed by quantities of Years' purchase; admitting as a Standard Rate of Perpetual Interest that of *four per centum*, to accrue by full yearly instalments,—and the Annuity to be payable at the expiration of each successive year, until the last accomplished previously to the failure of either of the lives.

N. B.—The Values expressed in the column of ***French-Annuitants*** are deduced (by Dr. Price's method described in *Section* XXXIV.) from Mr. Maseres's values at 4½ *per cent*. The values expressed in the next *three* columns are correctly ascertained according to first principles, as set forth in *Section* XXVII. The values by the ***Hypothesis*** have been computed by Mr. Simpson's rule, and the ***London*** values are taken from Mr. Simpson himself. It will be remarked, relatively to the general population of ***France***, that the values of lives *increase* instead of decreasing from the 85th to 88th year, which is accounted for by the notes to the preceding TABLES.

FIRST PART:—*Referable to Lives of similar ages.*

Common ages.	Annuitants of France.	Population of Sweden.	Population of France.	Northampton register.	Mr. Demoivre's hypothesis.	London register 1728 to 1757.	Common ages.	Annuitants of France.	Population of Sweden.	Population of France.	Northampton register.	Mr. Demoivre's hypothesis.	London register 1728 to 1757.
1	..	12.252	9.78192	8.252	..	..	53	8.857	7.994	7.30907	7.544	..	..
2	..	13.583	12.27756	11.107	..	..	54	8.594	7.748	7.07298	7.362	..	..
3	14.560	14.558	13.76966	12.325	..	..	55	8.353	7.495	6.83583	7.179	7.332	6.2
4	15.070	15.267	14.58898	13.185	..	..	56	8.100	7.229	6.59808	6.993	..	..
5	15.396	15.577	14.99316	13.591	..	..	57	7.834	6.954	6.36023	6.805	..	..
6	15.630	15.820	15.14883	14.005	..	..	58	7.589	6.678	6.12512	6.614	..	..
7	15.790	16.003	15.15756	14.224	..	..	59	7.331	6.388	5.88600	6.421	..	..
8	15.899	16.109	15.08019	14.399	..	..	60	7.062	6.104	5.65051	6.226	6.351	5.6
9	15.985	16.152	14.95325	14.396	..	..	61	6.777	5.844	5.41669	6.030	..	..
10	16.010	16.141	14.79867	14.277	13.342	13.0	62	6.475	5.600	5.18494	5.831	..	..
11	15.965	16.087	14.62981	14.133	..	..	63	6.192	5.367	4.95563	5.626	..	..
12	15.846	15.982	14.45473	13.966	..	..	64	5.889	5.128	4.72917	5.417	..	..
13	15.721	15.855	14.27858	13.789	..	..	65	5.567	4.881	4.50590	5.201	5.277	5.0
14	15.590	15.701	14.10441	13.604	..	..	66	5.256	4.626	4.28615	4.982	..	..
15	15.453	15.535	13.93166	13.411	12.860	12.3	67	4.957	4.369	4.07024	4.760	..	..
16	15.310	15.361	13.76390	13.212	..	..	68	4.671	4.130	3.85848	4.537	..	..
17	15.198	15.196	13.60044	13.019	..	..	69	4.402	3.851	3.65115	4.312	..	..
18	15.082	15.023	13.44131	12.841	..	..	70	4.153	3.593	3.44853	4.087	4.104	4.4
19	14.962	14.854	13.28623	12.679	..	..	71	3.898	3.345	3.25091	3.862	..	..
20	14.838	14.682	13.13501	12.535	12.341	11.3	72	3.671	3.128	3.05856	3.639	..	..
21	14.747	14.525	..	12.409	..	..	73	3.448	2.935	2.87182	3.421	..	..
22	14.653	14.360	..	12.293	..	..	74	3.232	2.797	2.69107	3.211	..	..
23	14.557	14.194	..	12.179	..	..	75	3.029	2.648	2.51657	3.015	..	3.7
24	14.459	14.020	..	12.062	..	..	76	2.803	2.490	2.34904	2.833	..	..
25	14.357	13.849	12.41793	11.944	11.786	10.5	77	2.588	2.340	2.18912	2.666	..	..
26	14.254	13.671	..	11.822	..	..	78	2.395	2.170	2.03780	2.470	..	..
27	14.147	13.495	..	11.699	..	..	79	2.192	1.967	1.89647	2.271	..	..
28	14.037	13.323	..	11.573	..	..	80	2.028	1.758	1.76714	2.068	..	..
29	13.923	13.148	..	11.445	..	..	81	1.880	1.600	1.65279	1.869	..	..
30	13.806	12.965	11.71479	11.313	11.182	9.6	82	1.761	1.472	1.55780	1.681	..	..
31	13.685	12.795	..	11.179	..	..	83	1.626	1.364	1.48862	1.510	..	..
32	13.559	12.624	..	11.042	..	..	84	1.452	1.276	1.45409	1.387	..	..
33	13.429	12.456	..	10.902	..	..	85	1.284	1.212	•1.46535	1.339	..	..
34	13.295	12.286	..	10.759	..	..	86	1.135	1.172	•1.53006	1.195	..	..
35	13.149	12.109	10.95761	10.612	10.530	8.8	87	1.030	1.127	•1.637.8	1.124	..	..
36	13.011	11.904	..	10.462	..	..	88	0.865	1.071	•1.71914	1.030	..	..
37	12.860	11.683	..	10.307	..	..	89	0.703	0.949	1.61796	1.015	..	..
38	12.665	11.452	..	10.149	..	..	90	0.548	0.718	1.51856	0.922	..	..
39	12.460	11.209	..	9.986	..	..	91	0.407	0.516	1.42082	0.756	..	..
40	12.245	10.964	10.09527	9.820	9.826	8.1	92	0.298	0.326	1.32477	0.583	..	..
41	12.019	10.732	..	9.654	..	..	93	0.240	0.236	1.23084	0.365	..	..
42	11.783	10.531	..	9.491	..	..	94	..	0.190	1.13894	0.201	..	..
43	11.534	10.364	..	9.326	..	..	95	..	..	1.04907	0.060	..	..
44	11.272	10.154	..	9.160	..	..	96	..	..	0.96159	..	..	..
45	10.996	9.954	9.10691	8.990	9.063	7.4	97	..	..	0.87629	..	..	..
46	10.705	9.736	..	8.815	..	..	98	..	..	0.79897	..	..	..
47	10.435	9.497	..	8.637	..	..	99	..	..	0.71358	..	..	..
48	10.150	9.236	..	8.453	..	..	100	..	..	0.63658	..	..	..
49	9.885	8.966	..	8.266	..	..	101	..	..	0.56278	..	..	..
50	9.605	8.707	8.00648	8.081	8.235	6.8	102	..	..	0.49213	..	..	..
51	9.345	8.469	7.77629	7.900	..	..	103	..	..	0.42622	..	..	..
52	9.107	8.230	7.54368	7.723	..	..	104	..	..	0.36289	..	..	..

SECOND PART:---*Referable to Lives of different ages.*

VALUES when the youngest life is aged from 1 to 83 accomplished years, and the oldest exceeds the preceding by 6, 12, 18, 24, 30, 36, and 42 years respectively; those values deduced from the probabilities of life for the *general population of Sweden*. Rate of Interest 4 *per cent. per annum.*

Age of the youngest life.	Excess of the oldest life, 6 years.	Excess of the oldest life, 12 years.	Excess of the oldest life, 18 years.	Excess of the oldest life, 24 years.	Excess of the oldest life, 30 years.	Excess of the oldest life, 36 years.	Excess of the oldest life, 42 years.
1	13.989	13.894	13.389	12.832	12.196	11.465	10.546
2	14.780	14.557	14.008	13.409	12.730	11.913	10.946
3	15.323	14.988	14.417	13.778	13.066	12.164	11.168
4	15.685	15.259	14.671	14.003	13.264	12.284	11.260
5	15.817	15.326	14.725	14.037	13.277	12.242	11.183
6	15.887	15.354	14.740	14.033	13.242	12.185	11.064
7	15.914	15.351	14.727	14.006	13.170	12.112	10.915
8	15.888	15.310	14.673	13.944	13.059	12.004	10.743
9	15.824	15.244	14.590	13.855	12.913	11.865	10.560
10	15.729	15.149	14.484	13.741	12.743	11.694	10.357
11	15.617	15.033	14.357	13.604	12 563	11.493	10.140
12	15.477	14.889	14.202	13.428	12.379	11.259	9.898
13	15.327	14.736	14.045	13.234	12.196	11.011	9.644
14	15.164	14.566	13.874	13.023	11.997	10.759	9.371
15	15.001	14.392	13.700	12.798	11.787	10.514	9.087
16	14.832	14.216	13 520	12.570	11.562	10.264	8.799
17	14.665	14.042	13.340	12.351	11.328	10.018	8.503
18	14.491	13.860	13.141	12.146	11.076	9.761	8.208
19	14.320	13.687	12.934	11.951	10.819	9.500	7.928
20	14.144	13.512	12.720	11.751	10.567	9.228	7.658
21	13.976	13.345	12.505	11.550	10.332	8.953	7.396
22	13.807	13.173	12.286	11.335	10.092	8.675	7.127
23	13.635	12.997	12.073	11.107	9.852	8.385	6.851
24	13.455	12.801	11.873	10.862	9.602	8.097	6.566
25	13.284	12.590	11.683	10.612	9.347	7.823	6.275
26	13.108	12.387	11.485	10.364	9.080	7.557	5.986
27	12.935	12.170	11.284	10.130	8.807	7.297	5.702
28	12.763	11.953	11.072	9.894	8.534	7.032	5.415
29	12.586	11.742	10.847	9.659	8.250	6.761	5.136
30	12.390	11 543	10.606	9.413	7.967	6.481	4.881
31	12.192	11.359	10.365	9.167	7.702	6.197	4.646
32	11.988	11.170	10.128	8.912	7.446	5.917	4.453
33	11.779	10.978	9.905	8.651	7.196	5.642	4.251
34	11.568	10.775	9.679	8.389	6.942	5.364	4.040
35	11.361	10.557	9.452	8.114	6.679	5.093	3.833
36	11.156	10.314	9.207	7.833	6.402	4.840	3.605
37	10.953	10.059	8.951	7.561	6.115	4.603	3.352
38	10.741	9.805	8.683	7.296	5.828	4.405	3.098
39	10.519	9.558	8.404	7.033	5.543	4.195	2.889
40	10.286	9.308	8.124	6.763	5.254	3.975	2.710
41	10.049	9.066	7.839	6.492	4.977	3.762	2.553
42	9.813	8.830	7.569	6.225	4.730	3.539	2.418
43	9.581	8.597	7.318	5.957	4.507	3.295	2.305
44	9 351	8.354	7.075	5.689	4.322	3.052	2.203
45	9.129	8.101	6.836	5.426	4.128	2.854	2.083
46	8.897	7.841	6.586	5.153	3.921	2.684	1.933
47	8.658	7.563	6.323	4.884	3.715	2.533	1.708
48	8.402	7.281	6.048	4.633	3.489	2.396	1.385
49	8.139	7.008	5.764	4.398	3.238	2.277	1.090
50	7.874	6.749	5.487	4.205	2.990	2.171	0.818
51	7.613	6.505	5.221	4.008	2.792	2.050	0.662
52	7.351	6.256	4.953	3.803	2.623	1.901	0.551
53	7.083	6.004	4.694	3.605	2.475	1.681	0.468
54	6.814	5.743	4.455	3.389	2.344	1.366	..
55	6.555	5.474	4.231	3.150	2.232	1.078	..
56	6.299	5.204	4.043	2.909	2.130	0.810	..
57	6.045	4.936	3.844	2.710	2.010	0.655	..
58	5.788	4.664	3.637	2.539	1.864	0.546	..
59	5.519	4.395	3.430	2.385	1.644	0.464	..
60	5.249	4.149	3.210	2.248	1.333		
61	4.984	3.927	2.974	2.135	1.050		
62	4.729	3.747	2.744	2.037	0.789		
63	4.482	3.563	2.557	1.926	0.639		
64	4.231	3.370	2.396	1.790	0.533		
65	3.982	3.180	2.252	1.585	0.456		
66	3.750	2.974	2.123	1.290	..		
67	3.527	2.743	2.010	1.017	..		
68	3.340	2.514	1.910	0.764	..		
69	3.147	2.324	1.798	0.617	..		
70	2.946	2.155	1.661	0.514	..		
71	2.752	2.004	1.464	0.441	..		
72	2.558	1.875	1.189	..	..		

Youngest life.	Excess of the oldest, 6 —	12 —	18 yrs.
73	2.355	1.768	0.937
74	2.172	1.692	0.708
75	2.017	1.605	0.575
76	1.877	1.497	0.481
77	1.756	1.339	0.421
78	1.639	1.097	..
79	1.524	0.863	..
80	1.416	0.638	..
81	1.320	0.511	..
82	1.225	0.427	..
83	1.094	0.379	..

SECOND PART *continued:—Lives of different ages,*
According to various systems of the Decrements and Probabilities of life.
Rate of interest, *four per cent. per annum.*

Ages.	By Northampton register.	By Mr. Demoivre's hypothesis.	By London register, 1728 to 1737.
5—10	13.933	..	..
15	13.479	..	..
20	12.993	..	..
25	12.633	..	..
30	12.220	..	..
35	11.732	..	..
40	11.150	..	..
45	10.500	..	..
50	9.742	..	..
55	8.931	..	..
60	8.011	..	..
65	6.963	..	..
70	5.768	..	..
75	4.557	..	..
10—15	13.841	13.093	12.7
20	13.355	12.808	12.2
25	12.998	12.480	11.6
30	12.586	12.102	10.9
35	12.098	11.665	10.2
40	11.513	11.156	9.6
45	10.851	10.564	9.0
50	10.085	9.871	8.4
55	9.256	9.059	7.8
60	8.314	8.105	7.2
65	7.236	6.980	6.5
70	6.008	5.652	5.8
75	4.725	..	5.1
80	3.517	..	..
15—20	12.961	12.593	11.8
25	12.630	12.281	11.8
30	12.246	11.921	10.6
35	11.787	11.501	10.0
40	11.234	11.013	9.4
45	10.607	10.440	8.8
50	9.872	9.767	8.2
55	9.077	8.975	7.6
60	8.170	8.041	7.0
65	7.127	6.934	6.4
70	5.933	5.623	5.7
75	4.695	..	5.0
80	3.492	..	..
85	2.462	..	..
20—25	12.229	12.051	10.8
30	11.873	11.711	10.3
35	11.445	11.314	9.8
40	10.924	10.847	9.2
45	10.330	10.297	8.6
50	9.630	9.648	8.0
55	8.869	8.879	7.5
60	7.995	7.967	6.9
65	6.986	6.882	6.3
70	5.826	5.590	5.7
75	4.619	..	5.0
80	3.443	..	..
85	2.431	..	..
90	1.704	..	..
25—30	11.618	11.468	10.1
35	11.217	11.093	9.6
40	10.725	10.655	9.1
45	10.160	10.131	8.5
50	9.488	9.509	7.9
55	8.754	8.766	7.4
60	7.906	7.880	6.8
65	6.920	6.826	6.2
70	5.780	5.551	5.6
75	4.589	..	4.9
80	3.425	..	..
85	2.421	..	..
90	1.699	..	..
95	0.236	..	..
30—35	10.948	10.838	9.2
40	10.490	10.428	8.8
45	9.959	9.936	8.3
50	9.321	9.345	7.8
55	8.619	8.634	7.3
60	7.802	7.779	6.7
65	6.844	6.748	6.1
70	5.729	5.505	5.5
75	4.557	..	4.9
80	3.406	..	..
85	2.411	..	..
90	1.694	..	..
95	1.236	..	..
35—40	10.196	10.157	8.5
45	9.706	9.702	8.1
50	9.110	9.149	7.6
55	8.448	8.476	7.1
60	7.669	7.658	6.5
65	6.747	6.662	6.0
70	5.663	5.450	5.4
75	4.516	..	4.8
80	3.383	..	..
85	2.398	..	..
90	1.688	..	..
95	0.235	..	..
40—45	9.381	9.418	7.8
50	8.834	8.911	7.4
55	8.221	8.283	6.9
60	7.490	7.510	6.4
65	6.614	6.556	5.9
70	5.571	5.383	5.4
75	4.457	..	4.8
80	3.349	..	..
85	2.379	..	..
90	1.679	..	..
95	0.235	..	..
45—50	8.503	8.619	7.1
55	7.948	8.044	6.7
60	7.274	7.332	6.3
65	6.453	6.425	5.8
70	5.460	5.300	5.3
75	4.386	..	4.7
80	3.308	..	..
85	2.356	..	..
90	1.668	..	..
95	0.234	..	..
50—55	7.593	7.738	6.5
60	6.989	7.091	6.1
65	6.236	6.258	5.7
70	5.306	5.193	5.2
75	4.285	..	4.6
80	3.247	..	..
85	2.322	..	..
90	1.651	..	..
95	0.233	..	..
55—60	6.659	6.781	5.5
65	5.986	6.036	5.9
70	5.132	6.053	6.1
75	4.171	..	4.5
80	3.180	..	..
85	2.284	..	..
90	1.633	..	..
95	0.232	..	..
60—65	5.658	5.730	5.3
70	4.900	4.858	4.9
75	4.021	..	4.4
80	3.092	..	..
85	2.234	..	..
90	1.608	..	..
95	0.230	..	..
65—70	4.573	4.571	4.6
75	3.806	..	4.2
80	2.965	..	..
85	2.163	..	..
90	1.575	..	..
95	0.228	..	..
70—75	3.471	..	4.0
80	2.757	..	..
85	2.042	..	..
90	1.515	..	..
95	0.224	..	..
75—80	2.448	..	..
85	1.856	..	..
90	1.413	..	..
95	0.217	..	..
80—85	1.608	..	..
90	1.278	..	..
95	0.208	..	..
85—90	1.054	..	..
95	0.187	..	..
90—95	0.177	..	..

Tables,

SOLVING THE QUESTIONS THAT DEPEND ON

Compound Interest,

ACCRUING EITHER ANNUALLY, HALF-YEARLY, OR QUARTERLY.

RATE of INTEREST: 3 *per Cent. per Ann.*——CORRESPONDING VALUE of

Years.	RATIO *of* INTEREST: *ANNUALLY,* 0.03.			RATIO *of* INTEREST: *HALF-YEARLY,* 0.015.			RATIO *of* INTEREST: *QUARTERLY,* 0.0075.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
0¼	....	....	....	....	....	....	1.0075 000	0.2500 000	0.2481 39
½	....	....	....	1.0150 000	0.5000 000	0.4926 11	1.0150 563	0.5018 750	0.4944 31
¾	....	....	....	....	....	....	1.0226 692	0.7556 391	0.7388 89
1	1.0300 000	1.0000 000	0.9708 74	1.0302 250	1.0075 000	0.9779 42	1.0303 392	1.0113 064	0.9815 28
¼	....	....	....	....	....	....	1.0380 667	1.2688 912	1.2223 60
½	....	....	....	1.0456 784	1.5226 125	1.4561 00	1.0458 522	1.5284 078	1.4613 99
¾	....	....	....	....	....	....	1.0536 961	1.7898 709	1.6986 59
2	1.0609 000	2.0300 000	1.9134 70	1.0613 636	2.0454 517	1.9271 92	1.0615 988	2.0532 949	1.9341 53
¼	....	....	....	....	....	....	1.0695 608	2.3186 946	2.1678 94
½	....	....	....	1.0772 840	2.5761 335	2.3913 23	1.0775 825	2.5860 848	2.3998 95
¾	....	....	....	....	....	....	1.0856 644	2.8554 805	2.6301 69
3	1.0927 270	3.0909 000	2.828 612	1.0934 433	3.1147 755	2.8485 94	1.0938 069	3.1268 966	2.8567 28
¼	....	....	....	....	....	....	1.1020 104	3.4003 483	3.0855 86
½	....	....	....	1.1098 449	3.6614 971	3.2991 07	1.1102 755	3.6758 509	3.3107 56
¾	....	....	....	....	....	....	1.1186 026	3.9534 198	3.5342 49
4	1.1255 088	4.1836 270	3.717 098	1.1264 926	4.2164 196	3.7429 63	1.1269 922	4.2330 721	3.7560 78
¼	....	....	....	....	....	....	1.1354 446	4.5148 185	3.9762 56
½	....	....	....	1.1433 900	4.7796 658	4.1802 59	1.1439 604	4.7986 796	4.1947 95
¾	....	....	....	....	....	....	1.1525 401	5.0846 697	4.4117 07
5	1.1592 741	5.3091 358	4.579 707	1.1605 409	5.3513 627	4.6110 93	1.1611 841	5.3728 047	4.6270 05
¼	....	....	....	....	....	....	1.1698 930	5.6631 008	4.8407 00
½	....	....	....	1.1779 489	5.9316 312	5.0355 59	1.1786 672	5.9555 740	5.0528 04
¾	....	....	....	....	....	....	1.1875 072	6.2502 408	5.2633 29
6	1.1940 523	6.4684 099	5.417 191	1.1956 182	6.5206 057	5.4537 53	1.1964 135	6.5471 176	5.4722 86
¼	....	....	....	....	....	....	1.2053 866	6.8462 210	5.6796 89
½	....	....	....	1.2135 524	7.1184 148	5.8657 66	1.2144 270	7.1475 677	5.8855 47
¾	....	....	....	....	....	....	1.2235 352	7.4511 744	6.0898 73
7	1.2298 739	7.6624 622	6.230 283	1.2317 557	7.7251 910	6.2716 91	1.2327 117	7.7570 583	6.2926 78
¼	....	....	....	....	....	....	1.2419 571	8.0652 362	6.4939 73
½	....	....	....	1.2502 321	8.3410 689	6.6716 17	1.2512 718	8.3757 255	6.6937 70
¾	....	....	....	....	....	....	1.2606 563	8.6885 434	6.8920 79
8	1.2667 701	8.8923 360	7.019 692	1.2689 855	8.9661 849	7.0656 32	1.2701 112	9.0037 075	7.0889 13
¼	....	....	....	....	....	....	1.2796 371	9.3212 353	7.2842 80
½	....	....	....	1.2880 203	9.6006 777	7.4538 25	1.2892 343	9.6411 446	7.4781 94
¾	....	....	....	....	....	....	1.2989 036	9.9634 532	7.6706 64
9	1.3047 732	10.159 106	7.786 109	1.3073 406	10.244 688	7.8362 80	1.3086 454	10.288 179	7.8617 01
¼	....	....	....	....	....	....	1.3184 602	10.615 340	8.0513 16
½	....	....	....	1.3269 507	10.898 358	8.2130 84	1.3283 486	10.944 955	8.2395 20
¾	....	....	....	....	....	....	1.3383 113	11.277 043	8.4263 22
10	1.3439 164	11.463 879	8.530 203	1.3468 550	11.561 832	8.5843 20	1.3483 456	11.611 620	8.6117 35
¼	....	....	....	....	....	....	1.3584 612	11.948 708	8.7957 66
½	....	....	....	1.3670 578	12.235 261	8.9500 69	1.3686 497	12.288 323	8.9784 28
¾	....	....	....	....	....	....	1.3789 146	12.630 485	9.1597 30
11	1.3842 339	12.807 796	9.252 624	1.3875 637	12.918 790	9.3104 12	1.3892 564	12.975 214	9.3396 83
¼	....	....	....	....	....	....	1.3996 758	13.322 528	9.5182 95
½	....	....	....	1.4083 772	13.612 572	9.6654 31	1.4101 734	13.672 447	9.6955 78
¾	....	....	....	....	....	....	1.4207 497	14.024 990	9.8715 42
12	1.4257 609	14.192 030	9.954 005	1.4295 028	14.316 760	10.015 20	1.4314 053	14.380 178	10.046 20
¼	....	....	....	....	....	....	1.4421 409	14.738 029	10.219 55
½	....	....	....	1.4509 454	15.031 512	10.359 81	1.4529 570	15.098 564	10.391 61
¾	....	....	....	....	....	....	1.4638 541	15.461 804	10.562 39
13	1.4685 337	15.617 790	10.634 96	1.4727 095	15.756 984	10.699 32	1.4748 330	15.827 767	10.731 90
¼	....	....	....	....	....	....	1.4858 943	16.196 475	10.900 15
½	....	....	....	1.4948 002	16.493 339	11.033 81	1.4970 385	16.567 949	11.067 15
¾	....	....	....	....	....	....	1.5082 663	16.942 209	11.232 90
14	1.5125 897	17.086 324	11.296 07	1.5172 222	17.240 739	11.363 36	1.5195 783	17.319 275	11.397 42
¼	....	....	....	....	....	....	1.5309 751	17.699 170	11.560 72
½	....	....	....	1.5399 805	17.999 350	11.688 04	1.5424 574	18.081 947	11.722 80
¾	....	....	....	....	....	....	1.5540 258	18.467 528	11.883 67
15	1.5579 674	18.598 914	11.957 93	1.5630 802	18.769 341	12.007 92	1.5656 810	18.856 034	12.043 34
¼	....	....	....	....	....	....	1.5774 236	19.247 455	12.201 83
½	....	....	....	1.5865 264	19.550 881	12.323 07	1.5892 543	19.641 811	12.359 14
¾	....	....	....	....	....	....	1.6011 737	20.039 125	12.515 27
16	1.6047 064	20.156 881	12.561 10	1.6103 243	20.344 144	12.633 57	1.6131 825	20.439 418	12.670 24
17	1.6528 476	21.761 588	13.166 12	1.6589 964	21.966 546	13.240 86	1.6621 252	22.070 840	13.278 69
18	1.7024 331	23.414 435	13.753 52	1.7091 395	23.637 985	13.830 34	1.7125 527	23.751 757	13.869 21
19	1.7535 061	25.116 868	14.323 80	1.7607 983	25.359 943	14.402 53	1.7645 102	25.483 673	14.442 35
20	1.8061 112	26.870 374	14.877 47	1.8140 184	27.133 947	14.957 92	1.8180 440	27.268 133	14.998 61
21	1.8602 946	28.676 486	15.415 02	1.8688 471	28.961 571	15.497 03	1.8732 020	29.106 732	15.538 49
22	1.9161 034	30.536 780	15.936 92	1.9253 330	30.844 434	16.020 31	1.9300 334	31.001 113	16.062 48
23	1.9735 865	32.452 884	16.443 61	1.9835 262	32.784 207	16.528 24	1.9885 891	32.952 969	16.571 03
24	2.0327 941	34.426 470	16.935 51	2.0434 783	34.782 610	17.021 28	2.0489 212	34.964 041	17.064 61
25	2.0937 779	36.459 264	17.413 15	2.1052 424	36.841 414	17.499 85	2.1110 839	37.036 128	17.543 66

PERPETUAL STOCK: 3 *p.C.* 100; 3½ *p.C.* 116,6667; 4 *p.C.* 133,3333; 5 *p.C.* 166,6667.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.03.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.015.			RATIO *of* INTEREST: *QUARTERLY*, 0.0075.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
0¼	....	....	....	....	....	....	0.9925 558	4.0000 000	4.0300 000
½	....	....	....	0.9852 217	2.0000.000	2.0300 000	0.9851 671	1.9925 745	2.0225 745
¾	....	....	....	....	....	....	0.9778 333	1.3233 831	1.3533 831
1	0.9708 737	1.0000 000	1.0300 000	0.9706 618	0.9925 558	1.0225 558	0.9705 542	0.9888 200	1.0188 200
¼	....	....	....	....	....	....	0.9633 292	0.7880 896	0.8180 896
½	....	....	....	0.9563 170	0.6567 659	0.6867 659	0.9561 580	0.6542 756	0.6842 756
¾	....	....	....	....	....	....	0.9490 402	0.5586 995	0.5886 995
2	0.9425 960	0.4926 108	0.5226 108	0.9421 841	0.4888 895	0.5188 895	0.9419 754	0.4870 221	0.5170 221
¼	....	....	....	....	....	....	0.9349 632	0.4312 771	0.4612 771
½	....	....	....	0.9282 603	0.3881 786	0.4181 786	0.9280 031	0.3866 849	0.4166 849
¾	....	....	....	....	....	....	0.9210 949	0.3502 038	0.3802 038
3	0.9151 417	0.3235 303	0.3535 303	0.9145 421	0.3210 504	0.3510 504	0.9142 381	0.3198 059	0.3498 059
¼	....	....	....	....	....	....	0.9074 324	0.2940 875	0.3240 875
½	....	....	....	0.9010 267	0.2731 183	0.3031 123	0.9006 773	0.2720 459	0.3020 459
¾	....	....	....	....	....	....	0.8939 726	0.2529 456	0.2829 456
4	0.8884 871	0.2390 270	0.2690 270	0.8877 111	0.2371 681	0.2671 681	0.8873 176	0.2362 352	0.2662 352
¼	....	....	....	....	....	....	0.8807 123	0.2214 928	0.2514 928
½	....	....	....	0.8745 922	0.2092 196	0.2392 196	0.8741 561	0.2083 907	0.2383 907
¾	....	....	....	....	....	....	0.8676 487	0.1966 696	0.2266 696
5	0.8626 088	0.1883 546	0.2183 546	0.8616 672	0.1868 683	0.2168 683	0.8611 899	0.1861 225	0.2161 225
¼	....	....	....	....	....	....	0.8547 790	0.1765 817	0.2065 817
½	....	....	....	0.8489 332	0.1685 877	0.1985 877	0.8484 159	0.1679 099	0.1979 099
¾	....	....	....	....	....	....	0.8421 001	0.1599 938	0.1899 938
6	0.8374 843	0.1545 975	0.1845 975	0.8363 874	0.1533 600	0.1833 600	0.8358 313	0.1527 390	0.1827 390
¼	....	....	....	....	....	....	0.8296 093	0.1460 660	0.1760 660
½	....	....	....	0.8240 270	0.1404 807	0.1704 807	0.8234 336	0.1399 077	0.1699 077
¾	....	....	....	....	....	....	0.8173 038	0.1342 071	0.1642 071
7	0.8130 915	0.1305 063	0.1605 063	0.8118 493	0.1294 466	0.1594 466	0.8112 197	0.1289 148	0.1589 148
¼	....	....	....	....	....	....	0.8051 808	0.1239 889	0.1539 889
½	....	....	....	0.7998 515	0.1198 886	0.1498 886	0.7991 869	0.1193 926	0.1493 926
¾	....	....	....	....	....	....	0.7932 376	0.1150 941	0.1450 941
8	0.7894 093	0.1124 564	0.1424 564	0.7880 310	0.1115 302	0.1415 302	0.7873 326	0.1110 653	0.1410 653
¼	....	....	....	....	....	....	0.7814 715	0.1072 819	0.1372 819
½	....	....	....	0.7763 853	0.1041 593	0.1341 593	0.7756 542	0.1037 221	0.1337 221
¾	....	....	....	....	....	....	0.7698 801	0.1003 668	0.1303 668
9	0.7664 167	0.0984 339	0.1284 339	0.7649 116	0.0976 116	0.1276 116	0.7641 490	0.0971 989	0.1271 989
¼	....	....	....	....	....	....	0.7584 605	0.0942 033	0.1242 033
½	....	....	....	0.7536 074	0.0917 569	0.1217 569	0.7528 144	0.0913 663	0.1213 663
¾	....	....	....	....	....	....	0.7472 103	0.0886 758	0.1186 758
10	0.7440 939	0.0872 305	0.1172 305	0.7424 704	0.0864 915	0.1164 915	0.7416 480	0.0861 206	0.1161 206
¼	....	....	....	....	....	....	0.7361 270	0.0836 911	0.1136 911
½	....	....	....	0.7314 979	0.0817 310	0.1117 310	0.7306 472	0.0813 781	0.1113 781
¾	....	....	....	....	....	....	0.7252 081	0.0791 735	0.1091 735
11	0.7224 213	0.0780 774	0.1080 774	0.7206 876	0.0774 066	0.1074 066	0.7198 095	0.0770 700	0.1070 700
¼	....	....	....	....	....	....	0.7144 511	0.0750 608	0.1050 608
½	....	....	....	0.7100 371	0.0734 615	0.1034 615	0.7091 326	0.0731 398	0.1031 398
¾	....	....	....	....	....	....	0.7038 537	0.0713 013	0.1013 013
12	0.7013 798	0.0704 621	0.1004 621	0.6995 439	0.0698 482	0.0998 482	0.6986 141	0.0695 402	0.0995 402
¼	....	....	....	....	....	....	0.6934 135	0.0678 517	0.0978 517
½	....	....	....	0.6892 058	0.0665 269	0.0965 269	0.6882 516	0.0662 315	0.0962 315
¾	....	....	....	....	....	....	0.6831 282	0.0646 755	0.0946 755
13	0.6809 513	0.0640 295	0.0940 295	0.6790 205	0.0634 639	0.0934 639	0.6780 429	0.0631 801	0.0931 801
¼	....	....	....	....	....	....	0.6729 954	0.0617 418	0.0917 418
½	....	....	....	0.6689 857	0.0606 305	0.0906 305	0.6679 855	0.0603 575	0.0903 575
¾	....	....	....	....	....	....	0.6630 129	0.0590 242	0.0890 242
14	0.6611 178	0.0585 263	0.0885 263	0.6590 993	0.0580 022	0.0880 022	0.6580 773	0.0577 391	0.0877 391
¼	....	....	....	....	....	....	0.6531 785	0.0564 998	0.0864 998
½	....	....	....	0.6493 589	0.0555 576	0.0855 576	0.6483 161	0.0553 039	0.0853 039
¾	....	....	....	....	....	....	0.6434 899	0.0541 491	0.0841 491
15	0.6418 620	0.0537 666	0.0837 666	0.6397 624	0.0532 784	0.0832 784	0.6386 997	0.0530 334	0.0830 334
¼	....	....	....	....	....	....	0.6339 451	0.0519 549	0.0819 549
½	....	....	....	0.6303 078	0.0511 486	0.0811 486	0.6292 259	0.0509 118	0.0809 118
¾	....	....	....	....	....	....	0.6245 418	0.0499 024	0.0799 024
16	0.6231 669	0.0496 108	0.0796 108	0.6209 929	0.0491 542	0.0791 542	0.6198 927	0.0489 251	0.0789 251
17	0.6050 164	0.0459 525	0.0759 525	0.6027 741	0.0455 238	0.0755 238	0.6016 394	0.0453 087	0.0753 087
18	0.5873 946	0.0427 087	0.0727 087	0.5850 897	0.0423 048	0.0723 048	0.5839 236	0.0421 021	0.0721 021
19	0.5702 860	0.0398 139	0.0698 139	0.5679 242	0.0394 323	0.0694 323	0.5667 295	0.0392 408	0.0692 408
20	0.5536 758	0.0372 157	0.0672 157	0.5512 623	0.0368 542	0.0668 542	0.5500 417	0.0366 728	0.0666 728
21	0.5375 493	0.0348 718	0.0648 718	0.5350 893	0.0345 285	0.0645 285	0.5338 452	0.0343 563	0.0643 563
22	0.5218 925	0.0327 474	0.0627 474	0.5193 907	0.0324 208	0.0624 208	0.5181 257	0.0322 569	0.0622 569
23	0.5066 918	0.0308 139	0.0608 139	0.5041 527	0.0305 025	0.0605 025	0.5028 691	0.0303 463	0.0603 463
24	0.4919 338	0.0290 474	0.0590 474	0.4893 617	0.0287 500	0.0587 500	0.4880 617	0.0286 008	0.0586 008
25	0.4776 056	0.0274 279	0.0574 279	0.4750 047	0.0271 434	0.0571 434	0.4736 903	0.0270 007	0.0570 007

RATE OF INTEREST: 3 *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.03.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.015.			RATIO *of* INTEREST: *QUARTERLY*, 0.0075.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	2.1565 913	38.553 042	17.876 84	2.1688 734	38.962 446	17.964 37	2.1751 324	39.171 081	18.008 60
27	2.2212 890	40.709 633	18.327 03	2.2344 276	41.147 586	18.415 27	2.2411 242	41.370 806	18.459 85
28	2.2879 277	42.930 922	18.764 11	2.3019 631	43.398 771	18.852 94	2.3091 181	43.637 269	18.897 81
29	2.3565 655	45.218 850	19.188 45	2.3715 400	45.717 999	19.277 77	2.3791 749	45.972 495	19.322 87
30	2.4272 625	47.575 415	19.600 44	2.4432 198	48.107 326	19.690 13	2.4513 571	48.378 570	19.735 42
31	2.5000 803	50.002 678	20.000 43	2.5170 661	50.568 870	20.090 40	2.5257 293	50.857 643	20.135 82
32	2.5750 827	52.502 758	20.388 76	2.5931 444	53.104 814	20.478 93	2.6023 579	53.411 929	20.524 44
33	2.6523 352	55.077 841	20.765 79	2.6715 222	55.717 407	20.856 05	2.6813 113	56.043 710	20.901 61
34	2.7319 053	57.730 176	21.131 84	2.7522 690	58.408 966	21.222 12	2.7626 601	58.755 337	21.267 67
35	2.8138 624	60.462 081	21.487 22	2.8354 563	61.181 876	21.577 44	2.8464 770	61.549 233	21.622 95
36	2.8982 783	63.275 944	21.832 25	2.9211 580	64.038 599	21.922 33	2.9328 368	64.427 893	21.967 77
37	2.9852 267	66.174 222	22.167 24	3.0094 500	66.981 665	22.257 11	3.0218 167	67.393 889	22.302 44
38	3.0747 835	69.159 449	22.492 46	3.1004 106	70.013 686	22.582 07	3.1134 962	70.449 872	22.627 26
39	3.1670 270	72.234 232	22.808 22	3.1941 205	73.137 350	22.897 49	3.2079 571	73.598 570	22.942 51
40	3.2620 378	75.401 259	23.114 77	3.2906 628	76.355 426	23.203 66	3.3052 839	76.842 798	23.248 47
41	3.3598 989	78.663 297	23.412 40	3.3901 231	79.670 769	23.500 85	3.4055 636	80.185 452	23.545 43
42	3.4606 959	82.023 196	23.701 36	3.4925 895	83.086 318	23.789 32	3.5088 856	83.629 520	23.833 64
43	3.5645 168	85.483 892	23.981 90	3.5981 531	86.605 102	24.069 32	3.6153 424	87.178 079	24.113 37
44	3.6714 523	89.048 408	24.254 27	3.7069 072	90.230 241	24.341 11	3.7250 289	90.834 297	24.384 86
45	3.7815 958	92.719 861	24.518 71	3.8189 485	93.964 950	24.604 93	3.8380 433	94.601 443	24.648 35
46	3.8950 437	96.501 457	24.775 45	3.9343 762	97.812 541	24.861 00	3.9544 864	98.482 880	24.904 09
47	4.0118 950	100.39 650	25.024 71	4.0532 927	101.77 642	25.109 57	4.0744 623	102.48 208	25.152 30
48	4.1322 519	104.40 840	25.266 71	4.1758 034	105.86 011	25.350 84	4.1980 782	106.60 261	25.393 19
49	4.2562 194	108.54 065	25.501 66	4.3020 171	110.06 724	25.585 03	4.3254 445	110.84 815	25.627 00
50	4.3839 060	112.79 687	25.729 76	4.4320 456	114.40 152	25.812 35	4.4566 750	115.22 250	25.853 92
51	4.5154 232	117.18 077	25.951 22	4.5660 041	118.86 680	26.033 00	4.5918 869	119.72 956	26.074 15
52	4.6508 859	121.69 620	26.166 24	4.7040 116	123.46 705	26.247 18	4.7312 010	124.37 337	26.287 91
53	4.7904 124	126.34 708	26.374 99	4.8461 904	128.20 635	26.455 08	4.8747 419	129.15 806	26.495 36
54	4.9341 248	131.13 749	26.577 66	4.9926 665	133.08 888	26.656 87	5.0226 376	134.08 792	26.696 72
55	5.0821 486	136.07 162	26.774 43	5.1435 698	138.11 899	26.852 75	5.1750 203	139.16 734	26.892 14
56	5.2346 130	141.15 377	26.965 46	5.2990 342	143.30 114	27.042 88	5.3320 263	144.40 876	27.081 80
57	5.3916 514	146.38 838	27.150 94	5.4591 975	148.63 992	27.227 43	5.4937 956	149.79 319	27.265 88
58	5.5534 010	151.78 003	27.331 01	5.6242 018	154.14 006	27.406 57	5.6604 729	155.34 910	27.444 54
59	5.7200 030	157.33 343	27.505 83	5.7941 933	159.80 644	27.580 44	5.8322 071	161.07 357	27.617 94
60	5.8916 031	163.05 344	27.675 56	5.9693 228	165.64 409	27.749 23	6.0091 516	166.97 172	27.786 24
61	6.0683 512	168.94 504	27.840 36	6.1497 455	171.65 818	27.913 05	6.1914 643	173.04 881	27.949 58
62	6.2504 017	175.01 339	28.000 34	6.3356 216	177.85 405	28.072 07	6.3793 084	179.31 028	28.108 11
63	6.4379 138	181.26 379	28.155 67	6.5271 158	184.23 719	28.226 43	6.5728 514	185.76 171	28.261 97
64	6.6310 512	187.70 171	28.306 48	6.7243 978	190.81 326	28.376 26	6.7722 664	192.40 888	28.411 30
65	6.8299 827	194.33 276	28.452 89	6.9276 428	197.58 809	28.521 69	6.9777 315	199.25 772	28.556 23
66	7.0348 822	201.16 274	28.595 04	7.1370 308	204.56 769	28.662 86	7.1894 302	206.31 434	28.696 90
67	7.2459 286	208.19 762	28.733 05	7.3527 475	211.75 825	28.799 88	7.4075 517	213.58 506	28.833 42
68	7.4633 065	215.44 355	28.867 04	7.5749 843	219.16 614	28.932 88	7.6322 908	221.07 636	28.965 93
69	7.6872 057	222.90 686	28.997 12	7.8039 382	226.79 794	29.051 99	7.8638 484	228.79 495	29.094 52
70	7.9178 219	230.59 406	29.123 42	8.0398 122	234.66 041	29.187 30	8.1024 312	236.74 771	29.219 34
71	8.1553 565	238.51 188	29.246 04	8.2828 156	242.76 052	29.308 94	8.3482 524	244.94 175	29.340 48
72	8.4000 172	246.66 724	29.365 09	8.5331 637	251.10 546	29.427 01	8.6015 316	253.38 439	29.458 05
73	8.6520 177	255.06 726	29.480 67	8.7910 785	259.70 262	29.541 61	8.8624 951	262.08 317	29.572 17
74	8.9115 783	263.71 928	29.592 88	9.0567 889	268.55 963	29.652 85	9.1313 760	271.04 587	29.682 93
75	9.1789 256	272.63 085	29.701 83	9.3305 303	277.68 434	29.760 83	9.4084 146	280.28 049	29.790 41
76	9.4542 934	281.80 978	29.807 60	9.6125 456	287.08 485	29.865 64	9.6938 583	289.79 528	29.894 73
77	9.7379 222	291.26 407	29.910 29	9.9030 848	296.76 949	29.967 38	9.9879 621	299.59 874	29.995 98
78	10.030 060	301.00 200	30.009 99	10.202 406	306.74 685	30.066 13	10.290 989	309.69 963	30.094 26
79	10.330 962	311.03 206	30.106 79	10.510 773	317.02 578	30.161 98	10.603 209	320.10 697	30.189 63
80	10.640 891	321.36 302	30.200 77	10.828 461	327.61 538	30.255 02	10.924 902	330.83 006	30.282 20
81	10.960 117	332.00 391	30.292 01	11.155 752	338.52 505	30.345 34	11.256 354	341.87 848	30.372 04
82	11.288 921	342.96 402	30.380 58	11.492 934	349.76 447	30.433 00	11.597 863	353.26 211	30.459 24
83	11.627 588	354.25 295	30.466 59	11.840 308	361.34 361	30.518 09	11.949 733	364.99 110	30.543 87
84	11.976 416	365.88 053	30.550 09	12.198 181	373.27 272	30.600 69	12.312 278	377.07 594	30.626 00
85	12.335 708	377.85 695	30.631 15	12.566 871	385.56 238	30.680 85	12.685 823	389.52 742	30.705 73
86	12.705 780	390.19 266	30.709 85	12.946 705	398.22 351	30.758 68	13.070 700	402.35 668	30.783 10
87	13.086 953	402.89 844	30.786 27	13.338 019	411.26 731	30.834 21	13.467 255	415.57 516	30.858 20
88	13.479 562	415.98 539	30.860 46	13.741 161	424.70 537	30.907 53	13.875 840	429.19 468	30.931 08
89	13.883 949	429.46 495	30.932 48	14.156 488	438.54 959	30.978 70	14.296 822	443.22 741	31.001 81
90	14.300 467	443.34 890	31.002 41	14.584 367	452.81 225	31.047 78	14.730 576	457.68 587	31.070 47
91	14.729 481	457.64 937	31.070 30	15.025 180	467.50 600	31.114 84	15.177 490	472 58 300	31.137 10
92	15.171 365	472.37 885	31.136 21	15.479 316	482.64 387	31.179 92	15.637 963	487.93 209	31.201 77
93	15.626 506	487.55 021	31.200 21	15.947 178	498.23 928	31.243 10	16.112 406	503.74 686	31.264 53
94	16.095 302	503.17 672	31.262 33	16.429 182	514.30 606	31.304 42	16.601 243	520.04 144	31.325 45
95	16.578 161	519.27 202	31.322 65	16.925 754	530.85 846	31.363 95	17.104 912	536.83 039	31.384 58
96	17.075 506	535.85 018	31.381 22	17.437 335	547.91 116	31.421 73	17.623 861	554.12 869	31.441 96
97	17.587 771	552.92 569	31.438 08	17.964 378	565.47 927	31.477 81	18.158 554	571.96 185	31.497 65
98	18.115 404	570.51 346	31.493 28	18.507 351	583.57 838	31.532 25	18.709 470	590.31 567	31.551 70
99	18.658 866	588.62 886	31.546 87	19.066 736	600.22 245	31.585 09	19.277 100	609.23 668	31.604 16
100	19.218 632	607.28 773	31.598 91	19.643 028	621.43 428	31.636 38	19.861 952	628.73 173	31.655 08
	Value of Perpetual Ann.		33.333 33	- - - - - - - - - -		33.333 33	- - - - - - - - - -		33.333 33

PERPETUAL STOCK: 3 *p.C.* 100; 3½ *p.C.* 116,6667; 4 *p.C.* 133,3333; 5 *p.C.* 166,6667.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.03.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.015.			RATIO *of* INTEREST: *QUARTERLY*, 0.0075.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.4636 947	0.0259 383	0.0559 383	0.4610 689	0.0256 657	0.0556 657	0.4597 421	0.0255 290	0.0555 290
27	0.4501 891	0.0245 642	0.0545 642	0.4475 419	0.0243 028	0.0543 028	0.4462 042	0.0241 716	0.0541 716
28	0.4370 768	0.0232 932	0.0532 932	0.4344 118	0.0230 421	0.0530 421	0.4330 658	0.0229 162	0.0529 162
29	0.4243 464	0.0221 147	0.0521 147	0.4216 669	0.0218 732	0.0518 732	0.4203 138	0.0217 521	0.0517 521
30	0.4119 868	0.0210 193	0.0510 193	0.4092 960	0.0207 869	0.0507 869	0.4079 373	0.0206 703	0.0506 703
31	0.3999 871	0.0199 989	0.0499 989	0.3972 879	0.0197 750	0.0497 750	0.3959 253	0.0196 627	0.0496 627
32	0.3883 370	0.0190 466	0.0490 466	0.3856 322	0.0188 307	0.0488 307	0.3842 669	0.0187 224	0.0487 224
33	0.3770 262	0.0181 561	0.0481 561	0.3743 185	0.0179 477	0.0479 477	0.3729 518	0.0178 432	0.0478 432
34	0.3660 449	0.0173 219	0.0473 219	0.3633 366	0.0171 207	0.0471 207	0.3619 700	0.0170 197	0.0470 197
35	0.3553 834	0.0165 393	0.0465 393	0.3526 769	0.0163 447	0.0463 447	0.3513 115	0.0162 472	0.0462 472
36	0.3450 324	0.0158 038	0.0458 038	0.3423 300	0.0156 156	0.0456 156	0.3409 668	0.0155 212	0.0455 212
37	0.3349 829	0.0151 116	0.0451 116	0.3322 866	0.0149 295	0.0449 295	0.3309 268	0.0148 381	0.0448 381
38	0.3252 262	0.0144 593	0.0444 593	0.3225 380	0.0142 829	0.0442 829	0.3211 824	0.0141 945	0.0441 945
39	0.3157 535	0.0138 438	0.0438 438	0.3130 752	0.0136 729	0.0436 729	0.3117 248	0.0135 872	0.0435 872
40	0.3065 568	0.0132 624	0.0432 624	0.3038 902	0.0130 966	0.0430 966	0.3025 459	0.0130 136	0.0430 136
41	0.2976 280	0.0127 124	0.0427 124	0.2949 746	0.0125 517	0.0425 517	0.2936 372	0.0124 711	0.0424 711
42	0.2889 592	0.0121 917	0.0421 917	0.2863 205	0.0120 357	0.0420 357	0.2849 908	0.0119 575	0.0419 575
43	0.2805 429	0.0116 981	0.0416 981	0.2779 204	0.0115 467	0.0415 467	0.2765 990	0.0114 708	0.0414 708
44	0.2723 718	0.0112 298	0.0412 298	0.2697 666	0.0110 828	0.0410 828	0.2684 543	0.0110 091	0.0410 091
45	0.2644 386	0.0107 852	0.0407 852	0.2618 522	0.0106 423	0.0406 423	0.2605 494	0.0105 706	0.0405 706
46	0.2567 365	0.0103 625	0.0403 625	0.2541 699	0.0102 236	0.0402 236	0.2528 773	0.0101 540	0.0401 540
47	0.2492 588	0.0099 605	0.0399 605	0.2467 130	0.0098 255	0.0398 255	0.2454 312	0.0097 578	0.0397 578
48	0.2419 988	0.0095 778	0.0395 778	0.2394 748	0.0094 464	0.0394 464	0.2382 042	0.0093 806	0.0393 806
49	0.2349 503	0.0092 131	0.0392 131	0.2324 491	0.0090 854	0.0390 854	0.2311 901	0.0090 213	0.0390 213
50	0.2281 071	0.0088 655	0.0388 655	0.2256 295	0.0087 411	0.0387 411	0.2243 825	0.0086 789	0.0386 789
51	0.2214 632	0.0085 338	0.0385 338	0.2190 099	0.0084 128	0.0384 128	0.2177 754	0.0083 522	0.0383 522
52	0.2150 128	0.0082 172	0.0382 172	0.2125 845	0.0080 993	0.0380 993	0.2113 628	0.0080 403	0.0380 403
53	0.2087 503	0.0079 147	0.0379 147	0.2063 476	0.0077 999	0.0377 999	0.2051 391	0.0077 425	0.0377 425
54	0.2026 702	0.0076 256	0.0376 256	0.2002 938	0.0075 138	0.0375 138	0.1990 986	0.0074 578	0.0374 578
55	0.1967 672	0.0073 491	0.0373 491	0.1944 175	0.0072 401	0.0372 401	0.1932 360	0.0071 856	0.0371 856
56	0.1910 361	0.0070 845	0.0370 845	0.1887 136	0.0069 783	0.0369 783	0.1875 459	0.0069 252	0.0369 252
57	0.1854 719	0.0068 311	0.0368 311	0.1831 771	0.0067 277	0.0367 277	0.1820 235	0.0066 759	0.0366 759
58	0.1800 698	0.0065 885	0.0365 885	0.1778 030	0.0064 876	0.0364 876	0.1766 637	0.0064 371	0.0364 371
59	0.1748 251	0.0063 559	0.0363 559	0.1725 866	0.0062 576	0.0362 576	0.1714 617	0.0062 083	0.0362 083
60	0.1697 331	0.0061 330	0.0361 330	0.1675 232	0.0060 370	0.0360 370	0.1664 129	0.0059 890	0.0359 890
61	0.1647 894	0.0059 191	0.0359 191	0.1626 084	0.0058 255	0.0358 255	0.1615 127	0.0057 787	0.0357 787
62	0.1599 897	0.0057 138	0.0357 138	0.1578 377	0.0056 226	0.0356 226	0.1567 568	0.0055 769	0.0355 769
63	0.1553 298	0.0055 168	0.0355 168	0.1532 070	0.0054 278	0.0354 278	0.1521 410	0.0053 832	0.0353 832
64	0.1508 057	0.0053 276	0.0353 276	0.1487 122	0.0052 407	0.0352 407	0.1476 610	0.0051 973	0.0351 973
65	0.1464 132	0.0051 458	0.0351 458	0 1443 492	0.0050 610	0.0350 610	0.1433 130	0.0050 186	0.0350 186
66	0.1421 488	0 0049 711	0.0349 711	0.1401 143	0.0048 884	0.0348 884	0.1390 931	0.0048 470	0.0348 470
67	0.1380 085	0.0048 031	0.0348 031	0.1360 036	0.0047 224	0.0347 224	0.1349 974	0.0046 820	0.0346 820
68	0.1339 889	0.0046 416	0.0346 416	0.1320 135	0.0045 627	0.0345 627	0.1310 223	0.0045 233	0.0345 233
69	0.1300 863	0.0044 862	0.0344 862	0.1281 404	0.0044 092	0.0344 092	0.1271 642	0.0043 707	0.0343 707
70	0.1262 973	0.0043 366	0.0343 366	0.1243 810	0.0042 615	0.0342 615	0.1234 198	0.0042 239	0.0342 239
71	0.1226 188	0.0041 927	0.0341 927	0.1207 319	0.0041 193	0.0341 193	0.1197 856	0.0040 826	0.0340 826
72	0.1190 474	0.0040 540	0.0340 540	0 1171 898	0.0039 824	0.0339 824	0.1162 584	0.0039 466	0.0339 466
73	0.1155 800	0.0039 205	0.0339 205	0.1137 517	0.0038 506	0.0338 506	0.1128 350	0.0038 156	0.0338 156
74	0.1122 135	0.0037 919	0.0337 919	0.1104 144	0.0037 236	0.0337 236	0.1095 125	0.0036 894	0.0336 894
75	0.1089 452	0.0036 680	0.0336 680	0.1071 750	0.0036 012	0.0336 012	0.1062 878	0.0035 679	0.0335 679
76	0.1057 720	0.0035 485	0.0335 485	0.1040 307	0.0034 833	0.0334 833	0.1031 581	0.0034 507	0.0334 507
77	0.1026 913	0.0034 333	0.0334 333	0.1009 786	0.0033 696	0.0333 696	0,1001 205	0.0033 378	0.0333 378
78	0.0997 003	0.0033 222	0.0333 222	0.0980 161	0.0032 600	0.0332 600	0.0971 724	0.0032 289	0.0332 289
79	0.0967 964	0.0032 151	0.0332 151	0.0951 405	0.0031 543	0.0331 543	0.0943 111	0.0031 240	0.0331 240
80	0.0939 771	0.0031 117	0.0331 117	0.0923 492	0.0030 524	0.0330 524	0.0915 340	0.0030 227	0.0330 227
81	0.0912 399	0.0030 120	0.0330 120	0.0896 399	0.0029 540	0.0329 540	0.0888 387	0.0029 250	0.0329 250
82	0.0885 824	0.0029 158	0.0329 158	0.0870 100	0.0028 591	0.0328 591	0.0862 228	0.0028 308	0.0328 308
83	0.0860 024	0.0028 228	0.0328 228	0.0844 573	0.0027 674	0.0327 674	0.0836 839	0.0027 398	0.0327 398
84	0.0834 974	0.0027 331	0.0327 331	0.0819 794	0.0026 790	0.0326 790	0.0812 197	0.0026 520	0.0326 520
85	0.0810 655	0.0026 465	0.0326 465	0.0795 743	0.0025 936	0.0325 936	0.0788 282	0,0025 672	0.0325 672
86	0.0787 043	0.0025 628	0.0325 628	0.0772 397	0.0025 112	0.0325 112	0.0765 070	0.0024 854	0.0324 854
87	0.0764 120	0.0024 820	0.0324 820	0.0749 736	0.0024 315	0.0324 315	0.0742 542	0.0024 063	0.0324 063
88	0.0741 864	0.0024 039	0.0324 039	0.0727 741	0.0023 546	0.0323 546	0.0720 677	0.0023 299	0.0323 299
89	0.0720 256	0.0023 285	0.0323 285	0.0706 390	0.0022 802	0.0322 802	0.0699 456	0.0022 562	0.0322 562
90	0.0699 278	0.0022 556	0.0322 556	0.0685 666	0.0022 084	0.0322 084	0.0678 860	0.0021 849	0.0321 849
91	0.0678 911	0.0021 851	0.0321 851	0.0665 549	0.0021 390	0.0321 390	0.0658 870	0.0021 160	0 0321 160
92	0.0659 136	0.0021 169	0.0321 169	0.0646 023	0.0020 719	0.0320 719	0.0639 469	0.0020 495	0.0320 495
93	0.0639 938	0 0020 511	0.0320 511	0.0627 070	0.0020 071	0.0320 071	0 0620 640	0.0019 851	0.0319 851
94	0.0621 299	0.0019 874	0.0319 874	0.0608 673	0.0019 444	0.0319 444	0.0602 365	0.0019 229	0.0319 229
95	0.0603 203	0.0019 258	0.0319 258	0.0590 816	0 0018 837	0.0318 837	0.0584 627	0.0018 628	0.0318 628
96	0.0585 634	0.0018 662	0.0318 662	0.0573 482	0.0018 251	0.0318 251	0.0567 413	0.0018 016	0.0318 046
97	0.0568 577	0.0018 086	0.0318 086	0.0556 657	0.0017 684	0.0317 684	0.0550 705	0.0017 484	0.0317 484
98	0.0552 016	0.0017 528	0.0317 528	0.0540 326	0.0017 136	0.0317 136	0.0534 489	0.0016 940	0.0316 940
99	0.0535 938	0.0016 989	0.0316 989	0.0524 474	0.0016 605	0.0316 605	0.0518 750	0.0016 414	0.0316 414
100	0.0520 328	0.0016 467	0.0316 467	0.0509 086	0.0016 092	0.0316 092	0.0503 475	0.0015 905	0.0315 905
	Ratio of Perpetual Ann.		0.0300 000	- - - - - - - - - -		0.0300 000	- - - - - - - - - -		0.0300 000

RATE of INTEREST: 3¼ *per Cent. per Ann.*——CORRESPONDING VALUE of

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0325.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.01625.			RATIO *of* INTEREST: *QUARTERLY*, 0.008125.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
0¼	....	....	....	....	....	....	1.0081 250	0.2500 000	0.2479 85
½	....	....	....	1.0162 500	0.5000 000	0.4920 05	1.0163 160	0.5020 313	0.4939 72
¾	....	....	....	....	....	....	1.0245 736	0.7561 103	0.7379 76
1	1.0325 000	1.0000 000	0.9685 23	1.0327 641	1.0081 250	0.9761 43	1.0328 982	1.0122 536	0.9800 13
¼	....	....	....	....	....	....	1.0412 905	1.2704 782	1.2201 00
½	....	....	....	1.0495 465	1.5245 070	1.4525 39	1.0497 510	1.5308 008	1.4582 51
¾	....	....	....	....	....	....	1.0582 803	1.7932 386	1.6944 84
2	1.0660 563	2.0325 000	1.9065 60	1.0666 016	2.0492 803	1.9213 18	1.0668 788	2.0578 087	1.9288 12
¼	....	....	....	....	....	....	1.0755 472	2.3245 284	2.1612 52
½	....	....	....	1.0839 339	2.5825 811	2.3826 00	1.0842 860	2.5934 152	2.3918 18
¾	....	....	....	....	....	....	1.0930 958	2.8644 867	2.6205 27
3	1.1007 031	3.0985 563	2.8150 70	1.1015 478	3.1245 480	2.8365 07	1.1019 772	3.1377 606	2.8473 92
¼	....	....	....	....	....	....	1.1109 308	3.4132 549	3.0724 28
½	....	....	....	1.1194 480	3.6753 219	3.2831 56	1.1199 571	3.6909 876	3.2956 51
¾	....	....	....	....	....	....	1.1290 567	3.9709 769	3.5170 75
4	1.1364 759	4.1992 593	3.6949 83	1.1376 390	4.2350 459	3.7226 63	1.1382 303	4.2532 411	3.7367 14
¼	....	....	....	....	....	....	1.1474 785	4.5377 987	3.9545 83
½	....	....	....	1.1561 256	4.8038 654	4.1551 42	1.1568 017	4.8246 683	4.1706 96
¾	....	....	....	....	....	....	1.1662 007	5.1138 687	4.3850 67
5	1.1734 114	5.3357 353	4.5471 99	1.1749 127	5.3819 282	4.5807 05	1.1756 762	5.4054 189	4.5977 11
¼	....	....	....	....	....	....	1.1852 285	5.6993 379	4.8086 41
½	....	....	....	1.1940 050	5.9693 845	4.9994 66	1.1948 585	5.9956 450	5.0178 71
¾	....	....	....	....	....	....	1.2045 667	6.2943 596	5.2254 14
6	1.2115 473	6.5091 467	5.3725 90	1.2134 076	6.5663 869	5.4115 29	1.2143 538	6.5955 013	5.4312 85
¼	....	....	....	....	....	....	1.2242 204	6.8990 898	5.6354 96
½	....	....	....	1.2331 254	7.1730 907	5.8170 03	1.2341 672	7.2051 449	5.8380 62
¾	....	....	....	....	....	....	1.2441 948	7.5136 867	6.0389 95
7	1.2509 226	7.7206 939	6.1720 00	1.2531 637	7.7896 534	6.2159 93	1.2543 039	7.8247 354	6.2383 09
¼	....	....	....	....	....	....	1.2644 951	8.1383 114	6.4360 16
½	....	....	....	1.2735 276	8.4162 353	6.6086 04	1.2747 691	8.4544 351	6.6321 30
¾	....	....	....	....	....	....	1.2851 266	8.7731 274	6.8266 64
8	1.2915 775	8.9716 165	6.9462 47	1.2942 225	9.0529 991	6.9949 36	1.2955 683	9.0944 091	7.0196 29
¼	....	....	....	....	....	....	1.3060 948	9.4183 012	7.2110 39
½	....	....	....	1.3152 536	9.7001 103	7.3750 91	1.3167 068	9.7448 248	7.4009 07
¾	....	....	....	....	....	....	1.3274 051	10.074 002	7.5892 45
9	1.3335 538	10.263 194	7.6961 23	1.3366 265	10.357 737	7.7491 67	1.3381 902	10.405 853	7.7760 64
¼	....	....	....	....	....	....	1.3490 630	10.740 400	7.9613 78
½	....	....	....	1.3583 466	11.026 050	8.1172 61	1.3600 241	11.077 666	8.1451 98
¾	....	....	....	....	....	....	1.3710 743	11.417 672	8.3275 37
10	1.3768 943	11.596 748	8.4223 95	1.3804 198	11.705 224	8.4794 70	1.3822 143	11.760 441	8.5084 06
¼	....	....	....	....	....	....	1.3934 448	12.105 994	8.6878 18
½	....	....	....	1.4028 516	12.395 434	8.8356 87	1.4047 666	12.454 356	8.8657 83
¾	....	....	....	....	....	....	1.4161 803	12.805 547	9.0423 14
11	1.4216 434	12.973 642	9.1258 07	1.4256 479	13.096 859	9.1866 05	1.4276 867	13.159 592	9.2174 23
¼	....	....	....	....	....	....	1.4392 867	13.516 514	9.3911 20
½	....	....	....	1.4488 147	13.809 683	9.5317 14	1.4509 809	13.876 336	9.5634 17
¾	....	....	....	....	....	....	1.4627 701	14.239 081	9.7343 26
12	1.4678 468	14.395 285	9.8070 77	1.4723 579	14.534 091	9.8713 06	1.4746 551	14.604 773	9.9038 57
¼	....	....	....	....	....	....	1.4866 367	14.973 437	10.072 02
½	....	....	....	1.4962 838	15.270 270	10.205 47	1.4987 156	15.345 096	10.238 83
¾	....	....	....	....	....	....	1.5108 927	15.719 775	10.404 30
13	1.5155 518	15.863 132	10.466 90	1.5205 984	16.018 412	10.534 28	1.5231 687	16.097 498	10.568 43
¼	....	....	....	....	....	....	1.5355 444	16.478 291	10.731 24
½	....	....	....	1.5453 081	16.778 711	10.857 84	1.5480 207	16.862 177	10.892 73
¾	....	....	....	....	....	....	1.5605 984	17.249 182	11.052 93
14	1.5648 072	17.378 684	11.105 96	1.5704 194	17.551 365	11.176 23	1.5732 783	17.639 331	11.211 83
¼	....	....	....	....	....	....	1.5860 612	18.032 651	11.369 46
½	....	....	....	1.5959 387	18.336 575	11.489 53	1.5989 479	18.429 166	11.525 81
¾	....	....	....	....	....	....	1.6119 394	18.828 903	11.680 90
15	1.6156 635	18.943 491	11.724 90	1.6218 727	19.134 544	11.797 81	1.6250 364	19.231 888	11.834 74
¼	....	....	....	....	....	....	1.6382 398	19.638 147	11.987 35
½	....	....	....	1.6482 281	19.945 480	12.101 17	1.6515 505	20.047 707	12.138 72
¾	....	....	....	....	....	....	1.6649 693	20.460 595	12.288 87
16	1.6681 725	20.559 155	12.324 36	1.6750 118	20.769 594	12.399 67	1.6784 972	20.876 837	12.437 81
17	1.7223 881	22.227 327	12.904 95	1.7298 920	22.458 215	12.982 44	1.7337 168	22.575 901	13.021 68
18	1.7783 658	23.949 715	13.467 26	1.7865 703	24.202 163	13.546 72	1.7907 530	24.330 862	13.586 94
19	1.8361 626	25.728 081	14.011 88	1.8451 056	26.003 249	14.093 09	1.8496 657	26.143 560	14.134 21
20	1.8958 379	27.564 244	14.539 35	1.9055 587	27.863 346	14.622 14	1.9105 164	28.015 890	14.664 04
21	1.9574 527	29.460 082	15.050 21	1.9679 926	29.784 387	15.134 40	1.9733 691	29.949 818	15.177 00
22	2.0210 699	31.417 534	15.545 00	2.0324 720	31.768 370	15.630 41	2.0382 895	31.947 368	15.673 62
23	2.0867 546	33.438 604	16.024 22	2.0990 641	33.817 355	16.110 68	2.1053 456	34.010 634	16.154 42
24	2.1545 742	35.525 359	16.488 34	2.1678 379	35.933 474	16.575 72	2.1746 078	36.141 778	16.619 91
25	2.2245 978	37.679 933	16.937 86	2.2388 651	38.118 926	17.026 00	2.2461 485	38.343 032	17.070 57

PERPET. STOCK: 3 *p.C.* 92,3077; 3½ *p.C.* 107,6923; 4 *p.C.* 123,0769; 5 *p.C.* 153,8462

Years.	RATIO *of* INTEREST: *ANNUALLY,* 0.0325.			RATIO *of* INTEREST: *HALF-YEARLY,* 0.01625.			RATIO *of* INTEREST: *QUARTERLY,* 0.008125.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
0¼	....	....	....	....	....	....	0.9919 405	4.0000 000	4.0325 000
½	....	....	....	0.9840 102	2.0000 000	2.0325 000	0.9839 459	1.9919 078	2.0244 078
¾	....	....	....	....	....	....	0.9760 158	1.3225 585	1.3550 585
1	0.9685 230	1.0000 000	1.0325 000	0.9682 753	0.9919 405	1.0244 405	0.9681 496	0.9878 947	1.0203 947
¼	....	....	....	....	....	....	0.9603 468	0.7871 053	0.8196 053
½	....	....	....	0.9527 925	0.6559 497	0.6884 497	0.9526 069	0.6532 528	0.6857 528
¾	....	....	....	....	....	....	0.9449 294	0.5576 503	0.5901 503
2	0.9380 368	0.4920 049	0.5245 049	0.9375 572	0.4879 762	0.5204 762	0.9373 136	0.4859 538	0.5184 538
¼	....	....	....	....	....	....	0.9297 593	0.4301 948	0.4626 948
½	....	....	....	0.9225 656	0.3872 095	0.4197 095	0.9222 659	0.3855 919	0.4180 919
¾	....	....	....	....	....	....	0.9148 329	0.3491 027	0.3816 027
3	0.9085 102	0.3227 310	0.3552 310	0.9078 135	0.3200 463	0.3525 463	0.9074 598	0.3186 986	0.3511 986
¼	....	....	....	....	....	....	0.9001 461	0.2929 755	0.3254 755
½	....	....	....	0.8932 975	0.2720 850	0.3045 850	0.8928 913	0.2709 302	0.3034 302
¾	....	....	....	....	....	....	0.8856 951	0.2518 272	0.2843 272
4	0.8799 130	0.2381 373	0.2706 373	0.8790 134	0.2361 250	0.2686 250	0.8785 568	0.2351 148	0.2676 148
¼	....	....	....	....	....	....	0.8714 760	0.2203 712	0.2528 712
½	....	....	....	0.8649 579	0.2081 657	0.2406 657	0.8644 523	0.2072 682	0.2397 682
¾	....	....	....	....	....	....	0.8574 853	0.1955 467	0.2280 467
5	0.8522 161	0.1874 156	0.2199 156	0.8511 271	0.1858 070	0.2183 070	0.8505 744	0.1849 996	0.2174 996
¼	....	....	....	....	....	....	0.8437 192	0.1754 590	0.2079 590
½	....	....	....	0.8375 174	0.1675 213	0.2000 213	0.8369 192	0.1667 878	0.1992 878
¾	....	....	....	....	....	....	0.8301 741	0.1588 724	0.1913 724
6	0.8253 908	0.1536 300	0.1861 300	0.8241 254	0.1522 906	0.1847 906	0.8234 833	0.1516 186	0.1841 186
¼	....	....	....	....	....	....	0.8168 464	0.1449 467	0.1774 467
½	....	....	....	0.8109 475	0.1394 099	0.1719 099	0.8102 630	0.1387 898	0.1712 898
¾	....	....	....	....	....	....	0.8037 327	0.1330 905	0.1655 905
7	0.7994 100	0.1295 220	0.1620 220	0.7979 803	0.1283 753	0.1608 753	0.7972 550	0.1277 999	0.1602 999
¼	....	....	....	....	....	....	0.7908 295	0.1228 756	0.1553 756
½	....	....	....	0.7852 205	0.1188 179	0.1513 179	0.7844 558	0.1182 812	0.1507 812
¾	....	....	....	....	....	....	0.7781 334	0.1139 844	0.1464 844
8	0.7742 470	0.1114 627	0.1439 627	0.7726 647	0.1104 606	0.1429 606	0.7718 620	0.1099 577	0.1424 577
¼	....	....	....	....	....	....	0.7656 412	0.1061 763	0.1386 763
½	....	....	....	0.7603 097	0.1030 915	0.1355 915	0.7594 705	0.1026 186	0.1351 186
¾	....	....	....	....	....	....	0.7533 495	0.0992 654	0.1317 654
9	0.7498 760	0.0974 356	0.1299 356	0.7481 522	0.0965 461	0.1290 461	0.7472 779	0.0960 998	0.1285 998
¼	....	....	....	....	....	....	0.7412 552	0.0931 064	0.1256 064
½	....	....	....	0.7361 891	0.0906 942	0.1231 942	0.7352 810	0.0902 718	0.1227 718
¾	....	....	....	....	....	....	0.7293 551	0.0875 835	0.1200 835
10	0.7262 722	0.0862 311	0.1187 311	0.7244 173	0.0854 319	0.1179 319	0.7234 769	0.0850 309	0.1175 309
¼	....	....	....	....	....	....	0.7176 459	0.0826 037	0.1151 037
½	....	....	....	0.7128 337	0.0806 748	0.1131 748	0.7118 620	0.0802 932	0.1127 932
¾	....	....	....	....	....	....	0.7061 248	0.0780 913	0.1105 913
11	0.7034 113	0.0770 794	0.1095 794	0.7014 355	0.0763 541	0.1088 541	0.7004 339	0.0759 902	0.1084 902
¼	....	....	....	....	....	....	0.6947 887	0.0739 836	0.1064 836
½	....	....	....	0.6902 194	0.0724 129	0.1049 129	0.6891 890	0.0720 652	0.1045 652
¾	....	....	....	....	....	....	0.6836 345	0.0702 293	0.1027 293
12	0.6812 700	0.0694 672	0.1019 672	0.6791 826	0.0688 037	0.1013 037	0.6781 246	0.0684 708	0.1009 708
¼	....	....	....	....	....	....	0.6726 593	0.0667 849	0.0992 849
½	....	....	....	0.6683 224	0.0654 867	0.0979 867	0.6672 380	0.0651 674	0.0976 674
¾	....	....	....	....	....	....	0.6618 604	0.0636 141	0.0961 141
13	0.6598 257	0.0630 393	0.0955 393	0.6576 359	0.0624 281	0.0949 281	0.6565 261	0.0621 215	0.0946 215
¼	....	....	....	....	....	....	0.6512 349	0.0606 859	0.0931 859
½	....	....	....	0.6471 202	0.0595 993	0.0920 993	0.6459 863	0.0593 043	0.0918 043
¾	....	....	....	....	....	....	0.6407 799	0.0579 738	0.0904 738
14	0.6390 564	0.0575 418	0.0900 418	0.6367 726	0.0569 756	0.0894 756	0.6356 155	0.0566 915	0.0891 915
¼	....	....	....	....	....	....	0.6304 927	0.0554 550	0.0879 550
½	....	....	....	0.6265 905	0.0545 358	0.0870 358	0.6254 112	0.0542 618	0.0867 618
¾	....	....	....	....	....	....	0.6203 707	0.0531 098	0.0856 098
15	0.6189 408	0.0527 886	0.0852 886	0.6165 712	0.0522 615	0.0847 615	0.6153 708	0.0519 970	0.0844 970
¼	....	....	....	....	....	....	0.6104 112	0.0509 213	0.0834 213
½	....	....	....	0.6067 121	0.0501 367	0.0826 367	0.6054 916	0.0498 810	0.0823 810
¾	....	....	....	....	....	....	0.6006 116	0.0488 744	0.0813 744
16	0.5994 584	0.0486 401	0.0811 401	0.5970 107	0.0481 473	0.0806 473	0.5957 710	0.0479 000	0.0804 000
17	0.5805 892	0.0449 897	0.0774 897	0.5780 708	0.0445 271	0.0770 271	0.5767 954	0.0442 950	0.0767 950
18	0.5623 140	0.0417 542	0.0742 542	0.5597 317	0.0413 186	0.0738 186	0.5584 243	0.0411 001	0.0736 001
19	0.5446 141	0.0388 680	0.0713 680	0.5419 744	0.0384 567	0.0709 567	0.5406 382	0.0382 503	0.0707 503
20	0.5274 712	0.0362 789	0.0687 789	0.5247 805	0.0358 894	0.0683 894	0.5234 187	0.0356 940	0.0681 940
21	0.5108 680	0.0339 442	0.0664 442	0.5081 320	0.0335 746	0.0660 746	0.5067 476	0.0333 892	0.0658 892
22	0.4947 874	0.0318 294	0.0643 294	0.4920 117	0.0314 779	0.0639 779	0.4906 075	0.0313 015	0.0638 015
23	0.4792 130	0.0299 056	0.0624 056	0.4764 028	0.0295 706	0.0620 706	0.4749 814	0.0294 026	0.0619 026
24	0.4641 288	0.0281 489	0.0606 489	0.4612 891	0.0278 292	0.0603 292	0.4598 530	0.0276 688	0.0601 688
25	0.4495 194	0.0265 393	0.0590 393	0.4466 549	0.0262 337	0.0587 337	0.4452 065	0.0260 804	0.0585 804

RATE OF INTEREST: 3¼ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0325.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.01625.			RATIO *of* INTEREST: *QUARTERLY*, 0.008125.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	2.2968 973	39.904 531	17.373 23	2.3122 194	40.375 981	17.462 00	2.3200 429	40.616 704	17.506 88
27	2.3715 464	42.201 428	17.794 90	2.3879 771	42.706 988	17.884 17	2.3963 682	42.965 176	17.929 29
28	2.4486 217	44.572 975	18.203 29	2.4662 169	45.114 367	18.292 94	2.4752 045	45.390 909	18.338 24
29	2.5282 019	47.021 596	18.598 83	2.5470 202	47.600 622	18.688 75	2.5566 344	47.896 443	18.734 18
30	2.6103 684	49.549 798	18.981 92	2.6304 710	50.168 337	19.072 00	2.6407 432	50.484 406	19.117 50
31	2.6952 054	52.160 167	19.352 95	2.7166 559	52.820 181	19.443 09	2.7276 190	53.157 508	19.488 61
32	2.7827 996	54.855 372	19.712 30	2.8056 646	55.558 909	19.802 41	2.8173 529	55.918 550	19.847 83
33	2.8732 406	57.638 172	20.060 34	2.8975 895	58.387 370	20.150 32	2.9100 388	58.770 426	20.195 75
34	2.9666 209	60.511 412	20.397 42	2.9925 263	61.308 502	20.487 20	3.0057 740	61.716 123	20.532 52
35	3.0630 361	63.478 033	20.723 89	3.0905 737	64.325 343	20.813 40	3.1046 587	64.758 729	20.858 56
36	3.1625 847	66.541 069	21.040 09	3.1918 334	67.441 028	21.129 24	3.2067 965	67.901 431	21.174 22
37	3.2653 687	69.703 654	21.346 33	3.2964 108	70.658 795	21.435 07	3.3122 945	71.147 522	21.479 83
38	3.3714 932	72.969 023	21.642 94	3.4044 146	73.981 989	21.731 19	3.4212 632	74.500 405	21.775 70
39	3.4810 668	76.340 516	21.930 21	3.5159 571	77.414 064	22.017 92	3.5338 167	77.963 591	22.062 15
40	3.5942 014	79.821 583	22.208 43	3.6311 541	80.958 589	22.295 55	3.6500 731	81.540 710	22.339 47
41	3.7110 130	83.415 784	22.477 90	3.7501 255	84.619 246	22.564 38	3.7701 541	85.235 509	22.607 96
42	3.8316 209	87.126 797	22.738 89	3.8729 948	88.399 841	22.824 67	3.8941 855	89.051 862	22.867 90
43	3.9561 486	90.958 418	22.991 66	3.9998 899	92.304 304	23.076 71	4.0222 974	92.993 765	23.119 56
44	4.0847 234	94.914 566	23.236 47	4.1309 425	96.336 693	23.320 75	4.1546 239	97.065 350	23.363 21
45	4.2174 769	98.999 290	23.473 58	4.2662 889	100.50 120	23.557 05	4.2913 037	101.27 088	23.599 09
46	4.3545 449	103.21 677	23.703 23	4.4060 699	104.80 215	23.785 85	4.4324 801	105.61 477	23.827 46
47	4.4960 676	107.57 131	23.925 64	4.5504 306	109.24 402	24.007 40	4.5783 009	110.10 157	24.048 56
48	4.6421 898	112.06 738	24.141 06	4.6995 212	113.83 142	24.221 92	4.7289 189	114.73 597	24.262 62
49	4.7930 610	116.70 957	24.349 69	4.8534 966	118.56 913	24.429 63	4.8844 921	119.52 283	24.469 86
50	4.9488 355	121.50 263	24.551 76	5.0125 169	123.46 206	24.630 75	5.0451 833	124.46 718	24.670 50
51	5.1096 726	126.45 147	24.747 47	5.1767 473	128.51 530	24.825 49	5.2111 610	129.57 418	24.864 74
52	5.2757 370	131.56 114	24.937 02	5.3463 586	133.73 411	25.014 06	5.3825 990	134.84 920	25.052 80
53	5.4471 984	136.83 688	25.120 60	5.5215 270	139.12 391	25.196 63	5.5596 771	140.29 776	25.234 87
54	5.6242 324	142.28 407	25.298 40	5.7024 346	144.69 030	25.373 42	5.7425 807	145.92 556	25.411 14
55	5.8070 200	147.90 831	25.470 60	5.8892 696	150.43 906	25.544 60	5.9315 015	151.73 851	25.581 80
56	5.9957 481	153.71 533	25.637 39	6.0822 261	156.37 619	25.710 36	6.1266 375	157.74 269	25.747 02
57	6.1906 099	159.71 107	25.798 92	6.2815 045	162.50 783	25.870 85	6.3281 931	163.94 440	25.906 98
58	6.3918 047	165.90 168	25.955 37	6.4873 121	168.84 037	26.026 24	6.5363 795	170.35 014	26.061 85
59	6.5995 384	172.29 349	26.106 90	6.6998 628	175.38 039	26.176 71	6.7514 150	176.96 661	26.211 78
60	6.8140 234	178.89 303	26.253 66	6.9193 775	182.13 469	26.322 41	6.9735 246	183.80 076	26.356 93
61	7.0354 791	185.70 705	26.395 79	7.1460 844	189.11 029	26.463 48	7.2029 414	190.85 973	26.497 47
62	7.2641 322	192.74 253	26.533 46	7.3802 192	196.31 444	26.600 08	7.4399 055	198.15 094	26.633 53
63	7.5002 165	200.00 666	26.666 78	7.6220 252	203.75 462	26.732 35	7.6846 653	205.68 201	26.765 25
64	7.7439 736	207.50 688	26.795 92	7.8717 537	211.43 857	26.860 42	7.9374 773	213.46 084	26.892 78
65	7.9956 527	215.25 085	26.920 99	8.1296 643	219.37 429	26.984 42	8.1986 064	221.49 558	27.016 24
66	8.2555 114	223.24 650	27.042 12	8.3960 251	227.57 000	27.104 49	8.4683 261	229.79 465	27.135 78
67	8.5238 155	231.50 202	27.159 43	8.6711 130	236.03 425	27.220 74	8.7469 192	238.36 674	27.251 50
68	8.8008 395	240.02 583	27.273 06	8.9552 139	244.77 581	27.333 35	9.0346 774	247.22 084	27.363 55
69	9.0868 668	248.82 667	27.383 11	9.2486 231	253.80 379	27.442 33	9.3319 025	256.36 623	27.472 02
70	9.3821 900	257.91 354	27.489 70	9.5516 456	263.12 756	27.547 88	9.6389 057	265.81 248	27.577 03
71	9.6871 112	267.29 573	27.592 92	9.8645 963	272.75 681	27.650 07	9.9560 087	275.56 950	27.678 71
72	10.001 942	276.98 284	27.692 90	10.187 801	282.70 155	27.749 03	10.283 544	285.64 751	27.777 14
73	10.327 005	286.98 478	27.789 74	10.521 594	292.97 213	27.844 84	10.621 854	296.05 706	27.872 44
74	10.662 633	297.31 179	27.883 52	10.866 324	303.57 921	27.937 62	10.971 295	306.80 907	27.964 70
75	11.009 169	307.97 442	27.974 36	11.222 349	314.53 383	28.027 45	11.332 231	317.91 480	28.054 03
76	11.366 967	318.98 359	28.062 33	11.590 039	325.84 736	28.114 43	11.705 042	329.38 590	28.140 51
77	11.736 393	330.35 056	28.147 54	11.969 776	337.53 157	28.198 65	12.090 117	341.23 437	28.224 23
78	12.117 826	342.08 695	28.230 06	12.361 954	349.59 860	28.280 20	12.487 861	353.47 263	28.305 29
79	12.511 655	354.20 477	28.309 99	12.766 982	362.06 099	28.359 17	12.898 689	366.11 352	28.383 77
80	12.918 284	366.71 643	28.387 39	13.185 280	374.93 171	28.435 63	13.323 033	379.17 026	28.459 75
81	13.338 128	379.63 471	28.462 37	13.617 284	388.22 412	28.509 66	13.761 338	392.65 655	28.533 31
82	13.771 617	392.97 284	28.534 98	14.063 441	401.95 204	28.581 34	14.214 062	406.58 652	28.604 52
83	14.219 195	406.74 446	28.605 31	14.524 217	416.12 975	28.650 75	14.681 679	420.97 475	28.673 47
84	14.681 319	420.96 365	28.673 42	15.000 089	430.77 197	28.717 96	15.164 681	435.83 634	28.740 23
85	15.158 462	435.64 497	28.739 39	15.491 553	445.89 394	28.783 03	15.663 572	451.18 684	28.804 84
86	15.651 112	450.80 343	28.803 29	15.999 119	461.51 136	28.846 05	16.178 876	467.04 235	28.867 41
87	16.159 773	466.45 455	28.865 17	16.523 315	477.64 047	28.907 06	16.711 133	483.41 948	28.927 98
88	16.684 965	482.61 432	28.925 10	17.064 686	494.29 804	28.966 13	17.260 900	500.33 538	28.986 62
89	17.227 227	499.29 928	28.983 15	17.623 795	511.50 138	29.023 34	17.828 753	517.80 779	29.043 40
90	17.787 112	516.52 651	29.039 37	18.201 222	529.26 836	29.078 73	18.415 288	535.85 501	29.098 37
91	18.365 193	534.31 362	29.093 82	18.797 568	547.61 747	29.132 36	19.021 118	554.49 595	29.151 59
92	18.962 061	552.67 881	29.146 56	19.413 452	566.56 777	29.184 29	19.646 880	573.75 015	29.203 11
93	19.578 328	571.64 088	29.197 63	20.049 516	586.13 896	29.234 57	20.293 225	593.63 770	29.252 99
94	20.214 624	591.21 920	29.247 10	20.706 420	606.35 137	29.283 26	20.960 837	614.17 960	29.301 28
95	20.871 599	611.43 383	29.295 02	21.384 846	627.22 603	29.330 40	21.650 412	635.39 728	29.348 04
96	21.549 926	632.30 543	29.341 42	22.085 501	648.78 463	29.376 04	22.362 672	657.31 299	29.393 30
97	22.250 299	653.85 535	29.386 36	22.809 111	671.04 958	29.420 24	23.098 365	679.94 968	29.437 13
98	22.973 434	676.10 565	29.429 89	23.556 430	694.04 401	29.463 04	23.858 260	703.25 416	29.479 55
99	23.720 070	699.07 909	29.472 05	24.328 235	717.79 184	29.504 48	24.643 155	727.48 170	29.520 63
100	24.490 973	722.79 916	29.512 88	25.125 327	742.31 774	29.544 60	25.453 872	752.42 683	29.560 40
	Value of Perpetual Ann.		30.769 23	- - - - - - - -		- 30.769 23	- - - - - - - - - -		30.769 23

PERPET. STOCK: 3 p.C. 92,3077; 3½ p.C. 107,6923; 4 p.C. 123,0769; 5 p.C. 153,8462.

Years.	RATIO of INTEREST: *ANNUALLY*, 0.0325.			RATIO of INTEREST: *HALF-YEARLY*, 0.01625.			RATIO of INTEREST: *QUARTERLY*, 0.008125.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.4353 699	0.0250 598	0.0575 598	0.4324 849	0.0247 672	0.0572 672	0.4310 265	0.0246 204	0.0571 204
27	0.4216 658	0.0236 959	0.0561 959	0.4187 644	0.0234 154	0.0559 154	0.4172 981	0.0232 747	0.0557 747
28	0.4083 930	0.0224 351	0.0549 351	0.4054 793	0.0221 659	0.0546 659	0.4040 070	0.0220 308	0.0545 308
29	0.3955 380	0.0212 668	0.0537 668	0.3926 156	0.0210 081	0.0535 081	0.3911 392	0.0208 784	0.0533 784
30	0.3830 877	0.0201 817	0.0526 817	0.3801 601	0.0199 329	0.0524 329	0.3786 812	0.0198 081	0.0523 081
31	0.3710 293	0.0191 717	0.0516 717	0.3680 996	0.0189 322	0.0514 322	0.3666 201	0.0188 120	0.0513 120
32	0.3593 504	0.0182 298	0.0507 298	0.3564 218	0.0179 991	0.0504 991	0.3549 431	0.0178 832	0.0503 832
33	0.3480 391	0.0173 496	0.0498 496	0.3451 145	0.0171 270	0.0496 270	0.3436 380	0.0170 154	0.0495 154
34	0.3370 838	0.0165 258	0.0490 258	0.3341 658	0.0163 110	0.0488 110	0.3326 930	0.0162 032	0.0487 032
35	0.3264 735	0.0157 535	0.0482 535	0.3235 645	0.0155 460	0.0480 460	0.3220 966	0.0154 419	0.0479 419
36	0.3161 971	0.0150 283	0.0475 283	0.3132 996	0.0148 278	0.0473 278	0.3118 377	0.0147 272	0.0472 272
37	0.3062 441	0.0143 465	0.0468 465	0.3033 603	0.0141 525	0.0466 525	0.3019 055	0.0140 553	0.0465 553
38	0.2966 045	0.0137 044	0.0462 044	0.2937 362	0.0135 168	0.0460 168	0.2922 897	0.0134 227	0.0459 227
39	0.2872 683	0.0130 992	0.0455 992	0.2844 176	0.0129 176	0.0454 176	0.2829 801	0.0128 265	0.0453 265
40	0.2782 259	0.0125 279	0.0450 279	0.2753 945	0.0123 520	0.0448 520	0.2739 671	0.0122 638	0.0447 638
41	0.2694 682	0.0119 881	0.0444 881	0.2666 577	0.0118 176	0.0443 176	0.2652 411	0.0117 322	0.0442 322
42	0.2609 862	0.0114 775	0.0439 775	0.2581 981	0.0113 122	0.0438 122	0.2567 931	0.0112 294	0.0437 294
43	0.2527 711	0.0109 940	0.0434 940	0.2500 069	0.0108 337	0.0433 337	0.2486 141	0.0107 534	0.0432 534
44	0.2448 146	0.0105 358	0.0430 358	0.2420 755	0.0103 803	0.0428 803	0.2406 957	0.0103 023	0.0428 023
45	0.2371 086	0.0101 011	0.0426 011	0.2343 957	0.0099 501	0.0424 501	0.2330 294	0.0098 745	0.0423 745
46	0.2296 451	0.0096 884	0.0421 884	0.2269 596	0.0095 418	0.0420 418	0.2256 073	0.0094 684	0.0419 684
47	0.2224 166	0.0092 962	0.0417 962	0.2197 594	0.0091 538	0.0416 538	0.2184 216	0.0090 825	0.0415 825
48	0.2154 156	0.0089 231	0.0414 231	0.2127 876	0.0087 849	0.0412 849	0.2114 648	0.0087 157	0.0412 157
49	0.2086 349	0.0085 683	0.0410 683	0.2060 370	0.0084 339	0.0409 339	0.2047 296	0.0083 666	0.0408 666
50	0.2020 677	0.0082 303	0.0407 303	0.1995 006	0.0080 997	0.0405 997	0.1982 088	0.0080 342	0.0405 342
51	0.1957 073	0.0079 082	0.0404 082	0.1931 715	0.0077 812	0.0402 812	0.1918 958	0.0077 176	0.0402 176
52	0.1895 470	0.0076 009	0.0401 009	0.1870 432	0.0074 775	0.0399 775	0.1857 838	0.0074 157	0.0399 157
53	0.1835 806	0.0073 080	0.0398 080	0.1811 093	0.0071 878	0.0396 878	0.1798 665	0.0071 277	0.0396 277
54	0.1778 020	0.0070 282	0.0395 282	0.1753 637	0.0069 113	0.0394 113	0.1741 377	0.0068 528	0.0393 528
55	0.1722 054	0.0067 609	0.0392 609	0.1698 003	0.0066 472	0.0391 472	0.1685 914	0.0065 903	0.0390 903
56	0.1667 849	0.0065 055	0.0390 055	0.1644 135	0.0063 948	0.0388 948	0.1632 216	0.0063 394	0.0388 394
57	0.1615 350	0.0062 613	0.0387 613	0.1591 975	0.0061 535	0.0386 535	0.1580 230	0.0060 996	0.0385 996
58	0.1564 503	0.0060 277	0.0385 277	0.1541 470	0.0059 228	0.0384 228	0.1529 899	0.0058 703	0.0383 703
59	0.1515 257	0.0058 041	0.0383 041	0.1492 568	0.0057 019	0.0382 019	0.1481 171	0.0056 508	0.0381 508
60	0.1467 562	0.0055 899	0.0380 899	0.1445 217	0.0054 904	0.0379 904	0.1433 995	0.0054 407	0.0379 407
61	0.1421 367	0.0053 849	0.0378 849	0.1399 368	0.0052 879	0.0377 879	0.1388 322	0.0052 395	0.0377 395
62	0.1376 627	0.0051 803	0.0376 883	0.1354 973	0.0050 939	0.0375 939	0.1344 103	0.0050 467	0.0375 467
63	0.1333 295	0.0049 998	0.0374 998	0.1311 987	0.0049 079	0.0374 079	0.1301 293	0.0048 619	0.0373 619
64	0.1291 327	0.0048 191	0.0373 191	0.1270 365	0.0047 295	0.0372 295	0.1259 846	0.0046 847	0.0371 847
65	0.1250 680	0.0046 457	0.0371 457	0.1230 063	0.0045 584	0.0370 584	0.1219 719	0.0045 148	0.0370 148
66	0.1211 312	0.0044 794	0.0369 794	0.1191 040	0.0043 943	0.0368 943	0.1180 871	0.0043 517	0.0368 517
67	0.1173 184	0.0043 196	0.0368 196	0.1153 255	0.0042 367	0.0367 367	0.1143 259	0.0041 952	0.0366 952
68	0.1136 255	0.0041 662	0.0366 662	0.1116 668	0.0040 854	0.0365 854	0.1106 846	0.0040 450	0.0365 450
69	0.1100 489	0.0040 189	0.0365 189	0.1081 242	0.0039 401	0.0364 401	0.1071 593	0.0039 007	0.0364 007
70	0.1065 849	0.0038 773	0.0363 773	0.1046 940	0.0038 004	0.0363 004	0.1037 462	0.0037 621	0.0362 621
71	0.1032 300	0.0037 412	0.0362 412	0.1013 726	0.0036 663	0.0361 663	0.1004 418	0.0036 289	0.0361 289
72	0.0999 806	0.0036 103	0.0361 103	0.0981 566	0.0035 373	0.0360 373	0.0972 427	0.0035 008	0.0360 008
73	0.0968 335	0.0034 845	0.0359 845	0.0950 426	0.0034 133	0.0359 133	0.0941 455	0.0033 777	0.0358 777
74	0.0937 856	0.0033 635	0.0358 635	0.0920 274	0.0032 940	0.0357 940	0.0911 469	0.0032 594	0.0357 594
75	0.0908 334	0.0032 470	0.0357 470	0.0891 079	0.0031 793	0.0356 793	0.0882 439	0.0031 455	0.0356 455
76	0.0879 742	0.0031 350	0.0356 350	0.0862 810	0.0030 689	0.0355 689	0.0854 333	0.0030 360	0.0355 360
77	0.0852 051	0.0030 271	0.0355 271	0.0835 437	0.0029 627	0.0354 627	0.0827 122	0.0029 305	0.0354 305
78	0.0825 231	0.0029 232	0.0354 232	0.0808 934	0.0028 604	0.0353 604	0.0800 778	0.0028 291	0.0353 291
79	0.0799 255	0.0028 232	0.0363 232	0.0783 270	0.0027 620	0.0352 620	0.0775 272	0.0027 314	0.0352 314
80	0.0774 097	0.0027 269	0.0352 269	0.0758 421	0.0026 672	0.0351 672	0.0750 580	0.0026 373	0.0351 373
81	0.0749 730	0.0026 341	0.0351 341	0.0734 361	0.0025 758	0.0350 758	0.0726 673	0.0025 468	0.0350 468
82	0.0726 131	0.0025 447	0.0350 447	0.0711 064	0.0024 879	0.0349 879	0.0703 529	0.0024 595	0.0349 595
83	0.0703 275	0.0024 585	0.0349 585	0.0688 505	0.0024 031	0.0349 031	0.0681 121	0.0023 754	0.0348 754
84	0.0681 138	0.0023 755	0.0348 755	0.0666 663	0.0023 214	0.0348 214	0.0659 427	0.0022 944	0.0347 944
85	0.0659 698	0.0022 954	0.0347 954	0.0645 513	0.0022 427	0.0347 427	0.0638 424	0.0022 164	0.0347 164
86	0.0638 932	0.0022 183	0.0347 183	0.0625 034	0.0021 668	0.0346 668	0.0618 090	0.0021 411	0.0346 411
87	0.0618 821	0.0021 438	0.0846 438	0.0605 205	0.0020 936	0.0345 936	0.0598 403	0.0020 686	0.0345 686
88	0.0599 342	0.0020 721	0.0345 721	0.0586 005	0.0020 231	0.0345 231	0.0579 344	0.0019 987	0.0344 987
89	0.0580 476	0.0020 028	0.0345 028	0.0567 415	0.0019 550	0.0344 550	0.0560 892	0.0019 312	0.0344 312
90	0.0562 205	0.0019 360	0.0344 360	0.0549 414	0.0018 894	0.0343 894	0.0543 027	0.0018 662	0.0343 662
91	0.0544 508	0.0018 716	0.0343 716	0.0531 984	0.0018 261	0.0343 261	0.0525 731	0.0018 034	0.0343 034
92	0.0527 369	0.0018 094	0.0343 094	0.0515 107	0.0017 650	0.0342 650	0.0508 987	0.0017 429	0.0342 429
93	0.0510 769	0.0017 493	0.0342 493	0.0498 765	0.0017 061	0.0342 061	0.0492 775	0.0016 845	0.0341 845
94	0.0494 691	0.0016 914	0.0341 914	0.0482 942	0.0016 492	0.0341 492	0.0477 080	0.0016 282	0.0341 282
95	0.0479 120	0.0016 355	0.0341 355	0.0467 621	0.0015 943	0.0340 943	0.0461 885	0.0015 738	0.0340 738
96	0.0464 039	0.0015 815	0.0340 815	0.0452 786	0.0015 413	0.0340 413	0.0447 174	0.0015 214	0.0340 214
97	0.0449 432	0.0015 294	0.0340 294	0.0438 421	0.0014 902	0.0339 902	0.0432 931	0.0014 707	0.0339 707
98	0.0435 285	0.0014 791	0.0339 791	0.0424 513	0.0014 408	0.0339 408	0.0419 142	0.0014 218	0.0339 218
99	0.0421 584	0.0014 304	0.0339 304	0.0411 045	0.0013 932	0.0338 932	0.0405 792	0.0013 746	0.0338 746
100	0.0408 314	0.0013 835	0.0338 835	0.0398 005	0.0013 471	0.0338 471	0.0392 867	0.0013 290	0.0338 290
	Ratio of Perpetual Ann.		0.0325 000	- - - - - - - - - -		0.0325 000	- - - - - - - - -		0.0325 000

RATE OF INTEREST: 3½ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.035.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.0175.			RATIO *of* INTEREST: *QUARTERLY*, 0.00875.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
0¼	....	....	....	....	....	....	1.0087 500	0.2500 000	0.247 831
½	....	....	....	1.0175 000	0.5000 000	0.491 400	1.0175 766	0.5021 875	0.493 513
¾	....	....	....	....	....	....	1.0264 804	0.7565 816	0.737 064
1	1.0350 000	1.0000 000	0.9661 84	1.0353 063	1.0087 500	0.974 349	1.0354 621	1.0132 017	0.978 502
¼	....	....	....	....	....	....	1.0445 224	1.2720 672	1.217 846
½	....	....	....	1.0534 241	1.5264 031	1.448 992	1.0536 619	1.5331 978	1.455 114
¾	....	....	....	....	....	....	1.0628 815	1.7966 133	1.690 323
2	1.0712 250	2.0350 000	1.8996 94	1.0718 590	2.0531 152	1.915 471	1.0721 817	2.0623 337	1.923 493
¼	....	....	....	....	....	....	1.0815 633	2.3303 791	2.154 640
½	....	....	....	1.0906 166	2.5890 447	2.373 928	1.0910 269	2.6007 699	2.383 782
¾	....	....	....	....	....	....	1.1005 734	2.8735 267	2.610 936
3	1.1087 179	3.1062 250	2.801 636	1.1097 024	3.1343 530	2.824 499	1.1102 034	3.1486 700	2.836 120
¼	....	....	....	....	....	....	1.1199 178	3.4262 209	3.059 350
½	....	....	....	1.1291 221	3.6892 042	3.267 321	1.1297 171	3.7062 003	3.280 645
¾	....	....	....	....	....	....	1.1396 021	3.9886 296	3.500 020
4	1.1475 230	4.2149 429	3.673 080	1.1488 818	4.2537 652	3.702 526	1.1495 737	4.2735 301	3.717 492
¼	....	....	....	....	....	....	1.1596 324	4.5609 236	3.933 077
½	....	....	....	1.1689 872	4.8282 061	4.130 247	1.1697 792	4.8508 317	4.146 793
¾	....	....	....	....	....	....	1.1800 148	5.1432 765	4.358 655
5	1.1876 863	5.3624 659	4.515 052	1.1894 445	5.4126 997	4.550 611	1.1903 399	5.4382 802	4.568 679
¼	....	....	....	....	....	....	1.2007 554	5.7358 651	4.776 881
½	....	....	....	1.2102 598	6.0074 220	4.963 746	1.2112 620	6.0360 540	4.983 277
¾	....	....	....	....	....	....	1.2218 605	6.3388 695	5.187 883
6	1.2292 553	6.5501 522	5.328 553	1.2314 393	6.6125 519	5.369 775	1.2325 518	6.6443 346	5.390 715
¼	....	....	....	....	....	....	1.2433 366	6.9524 726	5.591 786
½	....	....	....	1.2529 895	7.2282 715	5.768 821	1.2542 158	7.2633 067	5.791 114
¾	....	....	....	....	....	....	1.2651 902	7.5768 607	5.988 713
7	1.2722 793	7.7794 075	6.114 544	1.2749 168	7.8547 663	6.161 002	1.2762 606	7.8931 582	6.184 598
¼	....	....	....	....	....	....	1.2874 279	8.2122 234	6.378 783
½	....	....	....	1.2972 279	8.4922 247	6.546 440	1.2986 929	8.5340 804	6.571 285
¾	....	....	....	....	....	....	1.3100 565	8.8587 536	6.762 116
8	1.3168 090	9.0516 868	6.873 956	1.3199 294	9.1408 386	6.925 249	1.3215 195	9.1862 677	6.951 292
¼	....	....	....	....	....	....	1.3330 828	9.5166 476	7.138 828
½	....	....	....	1.3430 281	9.8008 033	7.297 541	1.3447 472	9.8499 183	7.324 736
¾	....	....	....	....	....	....	1.3565 138	10.186 105	7.509 032
9	1.3628 974	10.368 496	7.607 686	1.3665 311	10.472 317	7.663 431	1.3683 833	10.525 234	7.691 729
¼	....	....	....	....	....	....	1.3803 566	10.867 329	7.872 842
½	....	....	....	1.3904 454	11.155 583	8.023 028	1.3924 347	11.212 419	8.052 384
¾	....	....	....	....	....	....	1.4046 186	11.560 527	8.230 368
10	1.4105 988	11.731 393	8.316 605	1.4147 782	11.850 806	8.376 441	1.4169 090	11.911 682	8.406 808
¼	....	....	....	....	....	....	1.4293 069	12.265 909	8.581 719
½	....	....	....	1.4395 368	12.558 195	8.723 775	1.4418 134	12.623 236	8.755 111
¾	....	....	....	....	....	....	1.4544 292	12.983 689	8.927 000
11	1.4599 697	13.141 992	9.001 552	1.4647 287	13.277 963	9.065 135	1.4671 555	13.347 296	9.097 398
¼	....	....	....	....	....	....	1.4799 931	13.714 085	9.266 317
½	....	....	....	1.4903 615	14.010 327	9.400 623	1.4929 430	14.084 084	9.433 772
¾	....	....	....	....	....	....	1.5060 063	14.457 319	9.599 774
12	1.5110 687	14.601 962	9.663 333	1.5164 428	14.755 508	9.730 342	1.5191 838	14.833 821	9.764 336
¼	....	....	....	....	....	....	1.5324 767	15.213 617	9.927 471
½	....	....	....	1.5429 805	15.513 730	10.05 439	1.5458 858	15.596 736	10.08 919
¾	....	....	....	....	....	....	1.5594 123	15.983 207	10.24 951
13	1.5639 561	16.113 030	10.30 274	1.5699 827	16.285 220	10.37 287	1.5730 572	16.373 061	10.40 843
¼	....	....	....	....	....	....	1.5868 215	16.766 325	10.56 598
½	....	....	....	1.5974 574	17.070 211	10.68 586	1.6007 062	17.163 030	10.72 216
¾	....	....	....	....	....	....	1.6147 123	17.563 207	10.87 699
14	1.6186 945	17.676 986	10.92 052	1.6254 129	17.868 940	10.99 348	1.6288 411	17.966 885	11.03 047
¼	....	....	....	....	....	....	1.6430 934	18.374 095	11.18 262
½	....	....	....	1.6538 576	18.681 646	11.29 580	1.6574 705	18.784 868	11.33 346
¾	....	....	....	....	....	....	1.6719 734	19.199 236	11.48 298
15	1.6753 488	19.295 681	11.51 741	1.6828 001	19.508 575	11.59 292	1.6866 031	19.617 229	11.63 121
¼	....	....	....	....	....	....	1.7013 609	20.038 880	11.77 815
½	....	....	....	1.7122 491	20.349 975	11.88 494	1.7162 478	20.464 220	11.92 381
¾	....	....	....	....	....	....	1.7312 650	20.893 282	12.06 822
16	1.7339 860	20.971 030	12.09 411	1.7422 135	21.206 100	12.17 193	1.7464 136	21.326 099	12.21 137
17	1.7946 756	22.705 016	12.65 132	1.8037 245	22.963 558	12.73 119	1.8083 450	23.095 568	12.77 166
18	1.8574 892	24.499 691	13.18 968	1.8674 073	24.783 065	13.27 138	1.8724 726	24.927 786	13.31 277
19	1.9225 013	26.357 181	13.70 984	1.9333 384	26.666 812	13.79 314	1.9388 744	26.824 979	13.83 534
20	1.9897 889	28.279 682	14.21 240	2.0015 373	28.617 067	14.29 712	2.0076 308	28.789 449	14.34 002
21	2.0594 315	30.269 471	14.69 797	2.0722 662	30.636 178	14.78 390	2.0788 258	30.823 585	14.82 740
22	2.1315 116	32.328 902	15.16 712	2.1454 302	32.726 577	15.25 409	2.1525 452	32.929 854	15.29 810
23	2.2061 145	34.460 414	15.62 041	2.2211 773	34.890 780	15.70 824	2.2288 789	35.110 817	15.75 268
24	2.2833 285	36.666 528	16.05 837	2.2995 987	37.131 392	16.14 690	2.3079 195	37.369 121	16.19 170
25	2.3682 450	38.949 857	16.48 151	2.3807 889	39.451 112	16.57 060	2.3897 631	39.707 509	16.61 567

PERPETUAL STOCK: 3 *p.C.* 85,7143; 3½ *p.C.* 100; 4 *p.C.* 114,2857; 5 *p.C.* 142,8571.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.035.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.0175.			RATIO *of* INTEREST: *QUARTERLY*, 0.00875.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
0¼	....	....	....	....	....	....	0.9913 259	4.0000 000	4.0350 000
½	....	....	....	0.9828 010	2.0000 000	2.0350 000	0.9827 271	1.9912 881	2.0262 881
¾	....	....	....	....	....	....	0.9742 028	1.3217 344	1.3567 344
1	0.9661 836	1.0000 000	1.0350 000	0.9658 978	0.9913 259	1.0263 259	0.9657 525	0.9869 702	1.0219 702
¼	....	....	....	....	....	....	0.9573 754	0.7861 220	0.8211 220
½	....	....	....	0.9492 853	0.6551 349	0.6901 349	0.9490 710	0.6522 316	0.6872 316
¾	....	....	....	....	....	....	0.9408 387	0.5566 028	0.5916 028
2	0.9335 107	0.4914 005	0.5264 005	0.9329 585	0.4870 648	0.5220 648	0.9326 777	0.4848 876	0.5198 876
¼	....	....	....	....	....	....	0.9245 876	0.4291 148	0.4641 148
½	....	....	....	0.9169 125	0.3862 428	0.4212 428	0.9165 677	0.3845 015	0.4195 015
¾	....	....	....	....	....	....	0.9086 172	0.3480 044	0.3830 044
3	0.9019 427	0.3219 342	0.3569 342	0.9011 425	0.3190 451	0.3540 451	0.9007 358	0.3175 944	0.3525 944
¼	....	....	....	....	....	....	0.8929 227	0.2918 667	0.3268 667
½	....	....	....	0.8856 438	0.2710 612	0.3060 612	0.8851 774	0.2698 181	0.3048 181
¾	....	....	....	....	....	....	0.8774 993	0.2507 127	0.2857 127
4	0.8714 422	0.2372 511	0.2722 511	0.8704 116	0.2350 858	0.2700 858	0.8698 878	0.2339 986	0.2689 986
¼	....	....	....	....	....	....	0.8623 423	0.2192 539	0.2542 539
½	....	....	....	0.8554 412	0.2071 162	0.2421 162	0.8548 622	0.2061 502	0.2411 502
¾	....	....	....	....	....	....	0.8474 471	0.1944 286	0.2294 286
5	0.8419 731	0.1864 814	0.2214 814	0.8407 286	0.1847 507	0.2197 507	0.8400 962	0.1838 817	0.2188 817
¼	....	....	....	....	....	....	0.8328 092	0.1743 416	0.2093 416
½	....	....	....	0.8262 689	0.1664 607	0.2014 607	0.8255 853	0.1656 712	0.2006 712
¾	....	....	....	....	....	....	0.8184 241	0.1577 568	0.1927 568
6	0.8135 006	0.1526 682	0.1876 682	0.8120 579	0.1512 276	0.1862 276	0.8113 250	0.1505 042	0.1855 042
¼	....	....	....	....	....	....	0.8042 874	0.1438 337	0.1788 337
½	....	....	....	0.7980 913	0.1383 458	0.1733 458	0.7973 110	0.1376 783	0.1726 783
¾	....	....	....	....	....	....	0.7903 951	0.1319 808	0.1669 808
7	0.7859 910	0.1285 445	0.1635 445	0.7843 649	0.1273 112	0.1623 112	0.7835 391	0.1266 920	0.1616 920
¼	....	....	....	....	....	....	0.7767 425	0.1217 697	0.1567 697
½	....	....	....	0.7708 746	0.1177 548	0.1527 548	0.7700 050	0.1171 772	0.1521 772
¾	....	....	....	....	....	....	0.7633 260	0.1128 827	0.1478 827
8	0.7594 116	0.1104 766	0.1454 766	0.7576 163	0.1093 991	0.1443 991	0.7567 048	0.1088 582	0.1438 582
¼	....	....	....	....	....	....	0.7501 410	0.1050 790	0.1400 790
½	....	....	....	0.7445 860	0.1020 325	0.1370 325	0.7436 342	0.1015 237	0.1365 237
¾	....	....	....	....	....	....	0.7371 839	0.0981 730	0.1331 730
9	0.7337 310	0.0964 460	0.1314 460	0.7317 799	0.0954 899	0.1304 899	0.7307 895	0.0950 098	0.1300 098
¼	....	....	....	....	....	....	0.7244 505	0.0920 189	0.1270 189
½	....	....	....	0.7191 940	0.0896 412	0.1246 412	0.7181 666	0.0891 868	0.1241 868
¾	....	....	....	....	....	....	0.7119 371	0.0865 012	0.1215 012
10	0.7089 188	0.0852 414	0.1202 414	0.7068 246	0.0843 824	0.1193 824	0.7057 617	0.0839 512	0.1189 512
¼	....	....	....	....	....	....	0.6996 399	0.0815 268	0.1165 268
½	....	....	....	0.6946 679	0.0796 293	0.1146 293	0.6935 711	0.0792 190	0.1142 190
¾	....	....	....	....	....	....	0.6875 550	0.0770 197	0.1120 197
11	0.6849 457	0.0760 920	0.1110 920	0.6827 203	0.0753 128	0.1103 128	0.6815 911	0.0749 215	0.1099 215
¼	....	....	....	....	....	....	0.6756 789	0.0729 177	0.1079 177
½	....	....	....	0.6709 782	0.0713 759	0.1063 759	0.6698 180	0.0710 021	0.1060 021
¾	....	....	....	....	....	....	0.6640 079	0.0691 691	0.1041 691
12	0.6617 883	0.0684 839	0.1034 839	0.6594 380	0.0677 713	0.1027 713	0.6582 482	0.0674 135	0.1024 135
¼	....	....	....	....	....	....	0.6525 386	0.0657 306	0.1007 306
½	....	....	....	0.6480 963	0.0644 590	0.0994 590	0.6468 784	0.0641 160	0.0991 160
¾	....	....	....	....	....	....	0.6412 673	0.0625 657	0.0975 657
13	0.6394 042	0.0620 616	0.0970 616	0.6369 497	0.0614 054	0.0964 054	0.6357 049	0.0610 759	0.0960 759
¼	....	....	....	....	....	....	0.6301 907	0.0596 434	0.0946 434
½	....	....	....	0.6259 945	0.0585 816	0.0935 816	0.6247 243	0.0582 648	0.0932 648
¾	....	....	....	....	....	....	0.6193 054	0.0569 372	0.0919 372
14	0.6177 818	0.0565 707	0.0915 707	0.6152 283	0.0559 630	0.0909 630	0.6139 335	0.0556 579	0.0906 579
¼	....	....	....	....	....	....	0.6086 082	0.0544 245	0.0894 245
½	....	....	....	0.6046 469	0.0535 285	0.0885 285	0.6033 291	0.0532 343	0.0882 343
¾	....	....	....	....	....	....	0.5980 957	0.0520 854	0.0870 854
15	0.5968 906	0.0518 251	0.0868 251	0.5942 476	0.0512 595	0.0862 595	0.5929 077	0.0509 756	0.0859 756
¼	....	....	....	....	....	....	0.5877 648	0.0499 030	0.0849 030
½	....	....	....	0.5840 271	0.0491 401	0.0841 401	0.5826 665	0.0488 658	0.0838 658
¾	....	....	....	....	....	....	0.5776 124	0.0478 623	0.0828 623
16	0.5767 059	0.0476 848	0.0826 848	0.5739 824	0.0471 562	0.0821 562	0.5726 021	0.0468 909	0.0818 909
17	0.5572 038	0.0440 431	0.0790 431	0.5544 084	0.0435 473	0.0785 473	0.5529 919	0.0432 983	0.0782 983
18	0.5383 611	0.0408 168	0.0758 168	0.5355 018	0.0403 501	0.0753 501	0.5340 533	0.0401 159	0.0751 159
19	0.5201 557	0.0379 403	0.0729 403	0.5172 400	0.0374 998	0.0724 998	0.5157 632	0.0372 787	0.0722 787
20	0.5025 659	0.0353 611	0.0703 611	0.4996 010	0.0349 442	0.0699 442	0.4980 996	0.0347 349	0.0697 349
21	0.4855 709	0.0330 366	0.0680 366	0.4825 635	0.0326 411	0.0676 411	0.4810 409	0.0324 427	0.0674 427
22	0.4691 506	0.0309 321	0.0659 321	0.4661 070	0.0305 562	0.0655 562	0.4645 664	0.0303 676	0.0653 676
23	0.4532 856	0.0290 188	0.0640 188	0.4502 117	0.0286 609	0.0636 609	0.4486 561	0.0284 812	0.0634 812
24	0.4379 572	0.0272 728	0.0622 728	0.4348 585	0.0269 314	0.0619 314	0.4332 907	0.0267 601	0.0617 601
25	0.4231 470	0.0256 740	0.0606 740	0.4200 288	0.0253 478	0.0603 478	0.4184 516	0.0251 842	0.0601 842

RATE OF INTEREST: 3½ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.035.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.0175.			RATIO *of* INTEREST: *QUARTERLY*, 0.00875.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	2.4459 586	41.313 102	16.89 035	2.4648 457	41.852 742	16.97 986	2.4745 085	42.128 813	17.02 512
27	2.5315 671	43.759 060	17.28 537	2.5518 700	44.339 142	17.37 516	2.5522 598	44.635 991	17.42 056
28	2.6201 720	46.290 627	17.66 702	2.6419 670	46.913 348	17.75 698	2.6531 227	47.232 078	17.80 245
29	2.7118 780	48.910 799	18.03 577	2.7352 450	49.578 427	18.12 577	2.7472 079	49.920 225	18.17 126
30	2.8067 937	51.622 677	18.39 204	2.8318 164	52.337 617	18.48 199	2.8446 296	52.703 704	18.52 744
31	2.9050 315	54.429 471	18.73 628	2.9317 972	55.194 206	18.82 606	2.9455 060	55.585 887	18.87 142
32	3.0067 076	57.334 503	19.06 887	3.0353 079	58.151 653	19.15 841	3.0499 598	58.570 296	19.20 363
33	3.1119 424	60.341 210	19.39 021	3.1424 732	61.213 518	19.47 941	3.1581 177	61.660 505	19.52 445
34	3.2208 603	63.453 152	19.70 068	3.2534 221	64.383 502	19.78 947	3.2701 110	64.860 318	19.83 429
35	3.3335 905	66.674 013	20.00 066	3.3682 882	67.665 381	20.08 895	3.3860 758	68.173 589	20.13 351
36	3.4502 661	70.007 603	20.29 050	3.4872 098	71.063 139	20.37 822	3.5061 530	71.604 373	20.42 249
37	3.5710 254	73.457 869	20.57 053	3.6103 302	74.580 868	20.65 763	3.6304 886	75.156 818	20.70 157
38	3.6960 113	77.028 895	20.84 109	3.7377 974	78.222 787	20.92 751	3.7592 331	78.835 227	20.97 110
39	3.8253 717	80.724 906	21.10 250	3.8697 652	81.993 292	21.18 818	3.8925 431	82.644 088	21.23 139
40	3.9592 597	84.550 278	21.35 507	4.0063 921	85.896 921	21.43 997	4.0305 808	86.588 022	21.48 276
41	4.0978 338	88.509 538	21.59 910	4.1478 428	89.938 361	21.68 317	4.1735 136	90.671 817	21.72 554
42	4.2412 580	92.607 371	21.83 488	4.2942 874	94.122 500	21.91 807	4.3215 148	94.900 430	21.96 000
43	4.3897 020	96.848 629	22.06 269	4.4459 026	98.454 368	22.14 497	4.4747 649	99.279 000	22.18 648
44	4.5433 416	101.23 833	22.28 279	4.6028 708	102.93 917	22.36 412	4.6334 491	103.81 285	22.40 509
45	4.7023 536	105.78 167	22.49 545	4.7653 808	107.58 231	22.57 580	4.7977 610	108.50 746	22.61 627
46	4.8669 411	110.48 403	22.70 092	4.9336 291	112.38 940	22.78 027	4.9678 994	113.36 858	22.82 022
47	5.0372 840	115.35 097	22.89 942	5.1078 165	117.36 376	22.97 776	5.1440 712	118.40 204	23.01 718
48	5.2135 890	120.38 826	23.09 125	5.2881 543	122.51 869	23.16 852	5.3264 905	123.61 403	23.20 740
49	5.3960 646	125.60 185	23.27 657	5.4748 594	127.85 312	23.35 277	5.5153 790	129.01 083	23.39 111
50	5.5849 269	130.99 791	23.45 561	5.6681 561	133.37 589	23.53 074	5.7109 654	134.59 900	23.56 852
51	5.7803 993	136.58 284	23.62 862	5.8682 775	139.09 365	23.70 264	5.9134 881	140.38 538	23.73 986
52	5.9827 133	142.36 324	23.79 577	6.0754 639	145.01 324	23.86 867	6.1231 928	146.37 695	23.90 533
53	6.1921 083	148.34 595	23.95 726	6.2899 664	151.14 190	24.02 905	6.3403 333	152.58 096	24.06 513
54	6.4088 320	154.53 806	24.11 330	6.5120 411	157.48 690	24.18 395	6.5651 747	159.00 501	24.21 946
55	6.6334 412	160.94 689	24.26 406	6.7419 571	164.05 592	24.33 357	6.7979 894	165.65 683	24.36 851
56	6.8653 011	167.58 003	24.40 971	6.9799 907	170.85 688	24.47 810	7.0390 604	172.54 457	24.51 245
57	7.1055 866	174.44 533	24.55 044	7.2264 275	177.89 793	24.61 769	7.2886 798	179.67 658	24.65 146
58	7.3542 822	181.55 092	24.68 643	7.4815 653	185.18 757	24.75 252	7.5471 515	187.06 147	24.78 571
59	7.6116 820	188.90 520	24.81 779	7.7457 111	192.73 461	24.88 275	7.8147 890	194.70 825	24.91 536
60	7.8780 909	196.51 688	24.94 474	8.0191 839	200.54 192	25.00 855	8.0919 177	202.62 622	25.04 057
61	8.1538 241	204.39 497	25.06 737	8.3023 109	208.63 745	25.13 005	8.3788 735	210.82 496	25.16 149
62	8.4392 079	212.54 280	25.18 587	8.5954 349	217.01 245	25.24 741	8.6760 072	219.31 451	25.27 828
63	8.7345 802	220.98 801	25.30 036	8.8989 071	225.68 305	25.36 076	8.9836 750	228.10 501	25.39 106
64	9.0402 905	229.72 259	25.41 097	9.2130 938	234.65 982	25.47 025	9.3022 544	237.20 727	25.49 998
65	9.3567 007	238.76 288	25.51 785	9.5383 738	243.95 354	25.57 601	9.6321 311	246.63 233	25.60 517
66	9.6841 852	248.11 958	25.62 111	9.8751 382	253.57 545	25.67 816	9.9737 067	256.39 162	25.70 675
67	10.023 132	257.80 376	25.72 088	10.223 792	263.53 694	25.77 683	10.327 395	266.49 701	25.80 486
68	10.373 941	267.82 689	25.81 728	10.584 756	273.85 019	25.87 213	10.693 625	276.96 070	25.89 961
69	10.737 029	278.20 084	25.91 041	10.958 463	284.52 751	25.96 418	11.072 843	287.79 552	25.99 111
70	11.112 825	288.93 787	26.00 040	11.345 366	295.58 190	26.05 309	11.465 509	299.01 455	26.07 948
71	11.501 774	300.05 069	26.08 734	11.745 929	307.02 654	26.13 898	11.872 100	310.63 141	26.16 483
72	11.904 336	311.55 246	26.17 135	12.160 633	318.87 477	26.22 193	12.293 109	322.66 026	26.24 725
73	12.320 988	323.45 680	26.25 250	12.589 981	331.14 229	26.30 205	12.729 048	335.11 570	26.32 684
74	12.752 223	335.77 779	26.33 092	13.034 485	343.84 239	26.37 944	13.180 446	348.01 273	26.40 371
75	13.198 550	348.53 001	26.40 669	13.494 684	356.99 098	26.45 420	13.647 852	361.36 723	26.47 796
76	13.660 500	361.72 856	26.47 989	13.971 130	370.60 374	26.52 640	14.131 833	375.19 521	26.54 965
77	14.138 617	375.38 906	26.55 062	14.464 399	384.69 711	26.59 614	14.632 977	389.51 359	26.61 889
78	14.633 469	389.52 768	26.61 896	14.975 083	399.28 812	26.66 350	15.151 892	404.33 976	26.68 576
79	15.145 640	404.16 115	26.68 498	15.503 795	414.39 410	26.72 856	15.689 209	419.69 166	26.75 034
80	15.675 738	419.30 679	26.74 877	16.051 177	430.03 361	26.79 141	16.245 582	435.58 802	26.81 271
81	16.224 388	434.98 252	26.81 041	16.617 883	446.22 521	26.85 211	16.821 663	452.04 806	26.87 294
82	16.792 242	451.20 691	26.86 996	17.204 599	462.98 850	26.91 074	17.418 214	469.09 186	26.93 111
83	17.379 970	467.99 916	26.92 750	17.812 029	480.34 365	26.96 738	18.035 900	486.74 000	26.98 729
84	17.988 269	485.37 913	26.98 309	18.440 904	498.31 159	27.02 208	18.675 490	505.01 394	27.04 154
85	18.617 859	503.36 740	27.03 680	19.091 984	516.91 390	27.07 492	19.337 762	523.93 605	27.09 393
86	19.269 484	521.98 525	27.08 870	19.766 050	536.17 289	27.12 595	20.023 520	543.52 916	27.14 454
87	19.943 916	541.25 474	27.13 884	20.463 917	556.11 194	27.17 524	20.733 596	563.81 698	27.19 340
88	20.641 953	561.19 861	27.18 728	21.186 418	576.75 481	27.22 285	21.468 851	584.82 432	27.24 060
89	21.364 421	581.84 061	27.23 409	21.934 434	598.12 669	27.26 885	22.230 179	606.57 659	27.28 617
90	22.112 176	603.20 503	27.27 932	22.708 856	620.25 306	27.31 327	23.018 508	629.10 025	27.33 019
91	22.886 102	625.31 720	27.32 301	23.510 621	64.316 062	27.35 617	23.834 791	652.42 258	27.37 270
92	23.687 116	648.20 331	27.36 522	24.340 691	666.87 692	27.39 761	24.680 022	676.57 208	27.41 375
93	24.516 165	671.89 042	27.40 602	25.200 071	691.43 060	27.43 764	25.555 226	701.57 789	27.45 340
94	25.374 231	696.40 659	27.44 543	26.089 790	716.85 121	27.47 631	26.461 468	727.47 052	27.49 169
95	26.262 329	721.78 082	27.48 351	27.010 922	743.16 917	27.51 365	27.399 845	754.28 128	27.52 867
96	27.181 510	748.04 315	27.52 029	27.964 577	770.41 650	27.54 973	28.371 502	782.04 288	27.56 438
97	28.132 863	775.22 466	27.55 584	28.951 900	798.62 576	27.58 457	29.377 613	810.78 900	27.59 887
98	29.117 513	803.35 752	27.59 018	29.974 085	827.83 100	27.61 823	30.419 403	840.55 437	27.63 218
99	30.136 626	832.47 503	27.62 337	31.032 357	858.06 733	27.65 073	31.498 138	871.37 540	27.66 434
100	31.191 408	862.61 166	27.65 543	32.127 993	889.37 122	27.68 213	32.615 128	903.28 940	27.69 541
	Value of Perpetual Ann.		28.57 143	- - - - - - - - - -		28.57 143	- - - - - - - - - -		28.57 143

PERPETUAL STOCK: 3 *p.C.* 85,7143; 3½ *p.C.* 100; 4 *p.C.* 114,2857; 5 *p.C.* 142,8571.

Years.	RATIO *of* INTEREST: *ANNUALLY,* 0.035.			RATIO *of* INTEREST: *HALF-YEARLY,* 0.0175.			RATIO *of* INTEREST: *QUARTERLY,* 0.00875.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.4088 377	0.0242 054	0.0592 054	0.4057 049	0.0238 933	0.0588 933	0.4041 207	0.0237 367	0.0587 367
27	0.3950 122	0.0228 524	0.0578 524	0.3918 695	0.0225 534	0.0575 534	0.3902 805	0.0224 034	0.0574 034
28	0.3816 543	0.0216 026	0.0566 026	0.3785 058	0.0213 159	0.0563 159	0.3769 143	0.0211 721	0.0561 721
29	0.3687 482	0.0204 454	0.0554 454	0.3655 980	0.0201 701	0.0551 701	0.3640 059	0.0200 320	0.0550 320
30	0.3562 784	0.0193 713	0.0543 713	0.3531 303	0.0191 067	0.0541 067	0.3515 396	0.0189 740	0.0539 740
31	0.3442 304	0.0183 724	0.0533 724	0.3410 877	0.0181 178	0.0531 178	0.3395 002	0.0179 902	0.0529 902
32	0.3325 897	0.0174 415	0.0524 415	0.3294 559	0.0171 964	0.0521 964	0.3278 732	0.0170 735	0.0520 735
33	0.3213 427	0.0165 724	0.0515 724	0.3182 207	0.0163 363	0.0513 363	0.3166 443	0.0162 178	0.0512 178
34	0.3104 761	0.0157 597	0.0507 597	0.3073 687	0.0155 319	0.0505 319	0.3058 000	0.0154 177	0.0504 177
35	0.2999 769	0.0149 983	0.0499 983	0.2968 867	0.0147 786	0.0497 786	0.2953 271	0.0146 684	0.0496 684
36	0.2898 327	0.0142 842	0.0492 842	0.2867 622	0.0140 720	0.0490 720	0.2852 429	0.0139 656	0.0489 656
37	0.2800 316	0.0136 132	0.0486 132	0.2769 830	0.0134 083	0.0484 083	0.2754 450	0.0133 055	0.0483 055
38	0.2705 620	0.0129 821	0.0479 821	0.2675 372	0.0127 840	0.0477 840	0.2660 117	0.0126 847	0.0476 847
39	0.2614 125	0.0123 878	0.0473 878	0.2584 136	0.0121 961	0.0471 961	0.2569 015	0.0121 001	0.0471 001
40	0.2525 725	0.0118 273	0.0468 273	0.2496 011	0.0116 419	0.0466 419	0.2481 032	0.0115 489	0.0465 489
41	0.2440 314	0.0112 982	0.0462 982	0.2410 892	0.0111 187	0.0461 187	0.2396 063	0.0110 288	0.0460 288
42	0.2357 791	0.0107 983	0.0457 983	0.2328 675	0.0106 245	0.0456 245	0.2314 003	0.0105 374	0.0455 374
43	0.2278 059	0.0103 254	0.0453 254	0.2249 262	0.0101 570	0.0451 570	0.2234 754	0.0100 726	0.0450 726
44	0.2201 023	0.0098 777	0.0448 777	0.2172 557	0.0097 145	0.0447 145	0.2158 219	0.0096 327	0.0446 327
45	0.2126 592	0.0094 534	0.0444 534	0.2098 468	0.0092 952	0.0442 952	0.2084 306	0.0092 160	0.0442 160
46	0.2054 679	0.0090 511	0.0440 511	0.2026 906	0.0088 976	0.0438 976	0.2012 923	0.0088 208	0.0438 208
47	0.1985 196	0.0086 692	0.0436 692	0.1957 784	0.0085 203	0.0435 203	0.1943 985	0.0084 458	0.0434 458
48	0.1918 065	0.0083 065	0.0433 065	0.1891 019	0.0081 620	0.0431 620	0.1877 409	0.0080 897	0.0430 897
49	0.1853 202	0.0079 617	0.0429 617	0.1826 531	0.0078 215	0.0428 215	0.1813 112	0.0077 513	0.0427 513
50	0.1790 534	0.0076 337	0.0426 337	0.1764 242	0.0074 976	0.0424 976	0.1751 018	0.0074 295	0.0424 295
51	0.1729 984	0.0073 216	0.0423 216	0.1704 078	0.0071 894	0.0421 894	0.1691 049	0.0071 232	0.0421 232
52	0.1671 482	0.0070 243	0.0420 243	0.1645 965	0.0068 959	0.0418 959	0.1633 135	0.0068 317	0.0418 317
53	0.1614 959	0.0067 410	0.0417 410	0.1589 834	0.0066 163	0.0416 163	0.1577 204	0.0065 539	0.0415 539
54	0.1560 347	0.0064 709	0.0414 709	0.1535 617	0.0063 497	0.0413 497	0.1523 189	0.0062 891	0.0412 891
55	0.1507 581	0.0062 132	0.0412 132	0.1483 249	0.0060 955	0.0410 955	0.1471 023	0.0060 366	0.0410 366
56	0.1456 600	0.0059 673	0.0409 673	0.1432 667	0.0058 528	0.0408 528	0.1420 644	0.0057 956	0.0407 956
57	0.1407 343	0.0057 325	0.0407 325	0.1383 810	0.0056 212	0.0406 212	0.1371 991	0.0055 656	0.0405 656
58	0.1359 752	0.0055 081	0.0405 081	0.1336 619	0.0053 999	0.0403 999	0.1325 003	0.0053 458	0.0403 458
59	0.1313 770	0.0052 937	0.0402 937	0.1291 037	0.0051 885	0.0401 885	0.1279 625	0.0051 359	0.0401 359
60	0.1269 343	0.0050 886	0.0400 886	0.1247 010	0.0049 863	0.0399 863	0.1235 801	0.0049 352	0.0399 352
61	0.1226 418	0.0048 925	0.0398 925	0.1204 484	0.0047 930	0.0397 930	0.1193 478	0.0047 433	0.0397 433
62	0.1184 945	0.0047 048	0.0397 048	0.1163 408	0.0046 080	0.0396 080	0.1152 604	0.0045 597	0.0395 597
63	0.1144 875	0.0045 251	0.0395 251	0.1123 733	0.0044 310	0.0394 310	0.1113 130	0.0043 839	0.0393 839
64	0.1106 159	0.0043 531	0.0393 531	0.1085 412	0.0042 615	0.0392 615	0.1075 008	0.0042 157	0.0392 157
65	0.1068 753	0.0041 883	0.0391 883	0.1048 397	0.0040 991	0.0390 991	0.1038 192	0.0040 546	0.0390 546
66	0.1032 611	0.0040 303	0.0390 303	0.1012 644	0.0039 436	0.0389 436	0.1002 636	0.0039 003	0.0389 003
67	0.0997 692	0.0038 789	0.0388 789	0.0978 111	0.0037 945	0.0387 945	0.0968 299	0.0037 524	0.0387 524
68	0.0963 954	0.0037 338	0.0387 338	0.0944 755	0.0036 516	0.0386 516	0.0935 137	0.0036 106	0.0386 106
69	0.0931 356	0.0035 945	0.0385 945	0.0912 537	0.0035 146	0.0385 146	0.0903 110	0.0034 747	0.0384 747
70	0.0899 861	0.0034 610	0.0384 610	0.0881 417	0.0033 832	0.0383 832	0.0872 181	0.0033 443	0.0383 443
71	0.0869 431	0.0033 328	0.0383 328	0.0851 359	0.0032 570	0.0382 570	0.0842 311	0.0032 192	0.0382 192
72	0.0840 030	0.0032 097	0.0382 097	0.0822 326	0.0031 360	0.0381 360	0.0813 464	0.0030 992	0.0380 992
73	0.0811 623	0.0030 916	0.0380 916	0.0794 282	0.0030 198	0.0380 198	0.0785 605	0.0029 840	0.0379 840
74	0.0784 177	0.0029 782	0.0379 782	0.0767 196	0.0029 083	0.0379 083	0.0758 700	0.0028 735	0.0378 735
75	0.0757 659	0.0028 692	0.0378 692	0.0741 033	0.0028 012	0.0378 012	0.0732 716	0.0027 673	0.0377 673
76	0.0732 038	0.0027 645	0.0377 645	0.0715 762	0.0026 983	0.0376 983	0.0707 622	0.0026 653	0.0376 653
77	0.0707 283	0.0026 639	0.0376 639	0.0691 353	0.0025 994	0.0375 994	0.0683 388	0.0025 673	0.0375 673
78	0.0683 365	0.0025 672	0.0375 672	0.0667 776	0.0025 045	0.0375 045	0.0659 983	0.0024 732	0.0374 732
79	0.0660 256	0.0024 743	0.0374 743	0.0645 003	0.0024 132	0.0374 132	0.0637 381	0.0023 827	0.0373 827
80	0.0637 929	0.0023 849	0.0373 849	0.0623 007	0.0023 254	0.0373 254	0.0615 552	0.0022 957	0.0372 957
81	0.0616 356	0.0022 989	0.0372 989	0.0601 761	0.0022 410	0.0372 410	0.0594 471	0.0022 122	0.0372 122
82	0.0595 513	0.0022 163	0.0372 163	0.0581 240	0.0021 599	0.0371 599	0.0574 112	0.0021 318	0.0371 318
83	0.0575 375	0.0021 368	0.0371 368	0.0561 418	0.0020 818	0.0370 818	0.0554 450	0.0020 545	0.0370 545
84	0.0555 918	0.0020 602	0.0370 602	0.0542 273	0.0020 068	0.0370 068	0.0535 461	0.0019 801	0.0369 801
85	0.0537 119	0.0019 866	0.0369 866	0.0523 780	0.0019 346	0.0369 346	0.0517 123	0.0019 086	0.0369 086
86	0.0518 955	0.0019 158	0.0369 158	0.0505 918	0.0018 651	0.0368 651	0.0499 413	0.0018 398	0.0368 398
87	0.0501 406	0.0018 476	0.0368 476	0.0488 665	0.0017 982	0.0367 982	0.0482 309	0.0017 736	0.0367 736
88	0.0484 450	0.0017 819	0.0367 819	0.0472 000	0.0017 338	0.0367 338	0.0465 791	0.0017 099	0.0367 099
89	0.0468 068	0.0017 187	0.0367 187	0.0455 904	0.0016 719	0.0366 719	0.0449 839	0.0016 486	0.0366 486
90	0.0452 240	0.0016 578	0.0366 578	0.0440 357	0.0016 122	0.0366 122	0.0434 433	0.0015 896	0.0365 896
91	0.0436 946	0.0015 992	0.0365 992	0.0425 340	0.0015 548	0.0365 548	0.0419 555	0.0015 327	0.0365 327
92	0.0422 170	0.0015 427	0.0365 427	0.0410 835	0.0014 995	0.0364 995	0.0405 186	0.0014 780	0.0364 780
93	0.0407 894	0.0014 883	0.0364 883	0.0396 894	0.0014 463	0.0364 463	0.0391 309	0.0014 254	0.0364 254
94	0.0394 101	0.0014 359	0.0364 359	0.0383 292	0.0013 950	0.0363 950	0.0377 908	0.0013 746	0.0363 746
95	0.0380 774	0.0013 855	0.0363 855	0.0370 221	0.0013 456	0.0363 456	0.0364 966	0.0013 258	0.0363 258
96	0.0367 897	0.0013 368	0.0363 368	0.0357 595	0.0012 980	0.0362 980	0.0352 466	0.0012 787	0.0362 787
97	0.0355 456	0.0012 899	0.0362 899	0.0345 400	0.0012 522	0.0362 522	0.0340 395	0.0012 334	0.0362 334
98	0.0343 436	0.0012 448	0.0362 418	0.0333 622	0.0012 080	0.0362 080	0.0328 738	0.0011 897	0.0361 897
99	0.0331 822	0.0012 012	0.0362 012	0.0322 244	0.0011 654	0.0361 654	0.0317 479	0.0011 476	0.0361 476
100	0.0320 601	0.0011 593	0.0361 593	0.0311 255	0.0011 244	0.0361 244	0.0306 606	0.0011 071	0.0361 071
	Ratio of Perpetual Ann.		0.0350 000	. . . .		0.0350 000	. . . .		0.0350 000

RATE OF INTEREST: 3¾ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0375.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.01875.			RATIO *of* INTEREST: *QUARTERLY*, 0.009375.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
0¼	....	....	....	....	....	....	1.0093 750	0.2500 000	0.2476 78
½	....	....	....	1.0187 500	0.5000 000	0.4907 98	1.0188 379	0.5023 438	0.4930 56
¾	....	....	....	....	....	....	1.0283 895	0.7570 532	0.7361 54
1	1.0375 000	1.0000 000	0.9638 55	1.0378 516	1.0093 750	0.9725 62	1.0380 306	1.0141 506	0.9769 95
¼	....	....	....	....	....	....	1.0477 622	1.2736 583	1.2155 99
½	....	....	....	1.0573 113	1.5283 008	1.4454 60	1.0575 850	1.5355 988	1.4519 86
¾	....	....	....	....	....	....	1.0674 998	1.7999 950	1.6361 78
2	1.0764 063	2.0375 000	1.8928 73	1.0771 359	2.0569 564	1.9096 54	1.0775 076	2.0668 700	1.9181 95
¼	....	....	....	....	....	....	1.0876 093	2.3362 469	2.1480 57
½	....	....	....	1.0973 322	2.5955 244	2.3653 04	1.0978 056	2.6081 492	2.3757 84
¾	....	....	....	....	....	....	1.1080 975	2.8826 006	2.6013 96
3	1.1167 715	3.1139 063	2.7883 11	1.1179 071	3.1441 904	2.8125 69	1.1184 859	3.1596 250	2.8249 13
¼	....	....	....	....	....	....	1.1289 717	3.4392 465	3.0463 53
½	....	....	....	1.1388 679	3.7031 440	3.2516 01	1.1395 559	3.7214 894	3.2657 37
¾	....	....	....	....	....	....	1.1502 392	4.0063 784	3.4830 83
4	1.1586 504	4.2306 777	3.6513 84	1.1602 217	4.2725 780	3.6825 53	1.1610 227	4.2939 382	3.6984 10
¼	....	....	....	....	....	....	1.1719 073	4.5841 938	3.9117 38
½	....	....	....	1.1819 758	4.8526 888	4.1055 74	1.1828 939	4.8771 707	4.1230 84
¾	....	....	....	....	....	....	1.1939 835	5.1728 941	4.3324 67
5	1.2020 998	5.3893 281	4.4832 62	1.2041 379	5.4436 767	4.5208 09	1.2051 771	5.4713 900	4.5399 05
¼	....	....	....	....	....	....	1.2164 757	5.7726 843	4.7454 17
½	....	....	....	1.2267 155	6.0457 456	4.9284 01	1.2278 801	6.0768 032	4.9490 20
¾	....	....	....	....	....	....	1.2393 915	6.3837 733	5.1507 32
6	1.2471 785	6.5914 280	5.2850 72	1.2497 164	6.6591 034	5.3284 92	1.2510 108	6.6936 211	5.3505 70
¼	....	....	....	....	....	....	1.2627 390	7.0063 738	5.5485 53
½	....	....	....	1.2731 486	7.2839 616	5.7212 19	1.2745 772	7.3220 586	5.7446 96
¾	....	....	....	....	....	....	1.2865 264	7.6407 029	5.9390 18
7	1.2939 477	7.8386 066	6.0579 00	1.2970 201	7.9205 358	6.1067 18	1.2985 875	7.9623 345	6.1315 35
¼	....	....	....	....	....	....	1.3107 618	8.2869 814	6.3222 63
½	....	....	....	1.3213 392	8.5690 459	6.4851 22	1.3230 502	8.6146 718	6.5112 21
¾	....	....	....	....	....	....	1.3354 538	8.9454 344	6.6984 23
8	1.3424 708	9.1325 542	6.8027 96	1.3461 143	9.2297 155	6.8565 61	1.3479 737	9.2792 978	6.8838 87
¼	....	....	....	....	....	....	1.3606 109	9.6162 912	7.0676 28
½	....	....	....	1.3713 540	9.9027 727	7.2211 65	1.3733 666	9.9564 439	7.2496 62
¾	....	....	....	....	....	....	1.3862 420	10.299 786	7.4300 06
9	1.3928 134	10.475 025	7.5207 67	1.3970 669	10.588 450	7.5790 57	1.3992 380	10.646 346	7.6086 74
¼	....	....	....	....	....	....	1.4123 558	10.996 156	7.7856 84
½	....	....	....	1.4232 619	11.286 983	7.9303 63	1.4255 967	11.349 245	7.9610 49
¾	....	....	....	....	....	....	1.4389 616	11.705 644	8.1347 85
10	1.4450 439	11.807 838	8.2127 87	1.4499 480	11.998 614	8.2752 03	1.4524 519	12.065 384	8.3069 08
¼	....	....	....	....	....	....	1.4660 686	12.428 497	8.4774 32
½	....	....	....	1.4771 346	12.723 588	8.6136 96	1.4798 130	12.795 014	8.6463 72
¾	....	....	....	....	....	....	1.4936 863	13.164 968	8.8137 43
11	1.4992 331	13.312 882	8.8797 95	1.5048 308	13.462 155	8.9459 59	1.5076 896	13.538 389	8.9795 60
¼	....	....	....	....	....	....	1.5218 242	13.915 311	9.1438 37
½	....	....	....	1.5330 464	14.214 571	9.2721 07	1.5360 913	14.295 768	9.3065 87
¾	....	....	....	....	....	....	1.5504 921	14.679 790	9.4678 26
12	1.5554 543	14,812 116	9.5226 94	1.5617 910	14.981 094	9.5922 53	1.5650 280	15.067 413	9.6275 68
¼	....	....	....	....	....	....	1.5797 001	15.458 670	9.7858 26
½	....	....	....	1.5910 746	15.761 989	9.9065 06	1.5945 098	15.853 595	9.9426 14
¾	....	....	....	....	....	....	1.6094 584	16.252 223	10.097 95
13	1.6137 839	16.367 570	10.142 36	1.6209 073	16.557 527	10.214 97	1.6245 470	16.654 587	10.251 83
¼	....	....	....	....	....	....	1.6397 772	17.060 724	10.404 29
½	....	....	....	1.6512 993	17.367 980	10.517 77	1.6551 501	17.470 669	10.565 34
¾	....	....	....	....	....	....	1.6706 671	17.884 456	10.704 98
14	1.6743 008	17.981 354	10.739 62	1.6822 611	18.193 630	10.814 99	1.6863 296	18.302 123	10.853 23
¼	....	....	....	....	....	....	1.7021 389	18.723 705	11.000 10
½	....	....	....	1.7138 035	19.034 761	11.106 73	1.7180 965	19.149 240	11.145 61
¾	....	....	....	....	....	....	1.7342 037	19.578 764	11.289 77
15	1.7370 870	19.655 654	11.315 30	1.7459 373	19.891 662	11.393 11	1.7504 618	20.012 315	11.432 59
¼	....	....	....	....	....	....	1.7668 724	20.449 930	11.574 08
½	....	....	....	1.7786 737	20.764 631	11.674 22	1.7834 368	20.891 649	11.714 26
¾	....	....	....	....	....	....	1.8001 565	21.337 508	11.853 14
16	1.8022 278	21.392 742	11.870 17	1.8120 238	21.653 968	11.960 16	1.8170 330	21.787 547	11.990 73
17	1.8698 113	23.194 969	12.404 98	1.8806 117	22.482 979	12.486 88	1.8861 359	23.630 292	12.528 41
18	1.9399 293	25.064 781	12.920 46	1.9517 958	25.381 222	13.004 03	1.9578 669	25.543 118	13.046 40
19	2.0126 766	27.004 710	13.417 31	2.0256 743	27.351 316	13.502 32	2.0323 259	27.528 690	13.545 41
20	2.0881 520	29.017 387	13.896 20	2.1023 493	29.395 981	13.982 44	2.1096 165	29.589 774	14.026 14
21	2.1664 577	31.105 539	14.357 79	2.1819 265	31.518 040	14.445 05	2.1898 466	31.729 243	14.489 25
22	2.2476 999	33.271 996	14.802 69	2.2645 158	33.720 422	14.890 79	2.2731 279	33.950 077	14.935 40
23	2.3319 886	35.519 696	15.231 51	2.3502 313	36.006 167	15.320 26	2.3595 764	36.255 371	15.366 20
24	2.4194 382	37.851 685	15.644 82	2.4391 912	38.378 432	15.734 08	2.4493 126	38.648 337	15.779 26
25	2.5101 671	40.271 123	16.043 20	2.5315 184	40.840 491	16.132 80	2.5424 616	41.132 309	16.178 14

PERPETUAL STOCK: 3 p. C. 80; 3½ p. C. 93,3333; 4 p. C. 106,6667; 5 p. C. 133,3333.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0375.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.01875.			RATIO *of* INTEREST: *QUARTERLY*, 0.009375.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
0¼	....	....	....	....	....	....	0.9907 121	4.0000 000	4.0375 000
½	....	....	....	0.9815 951	2.0000 000	2.0375 000	0.9815 104	1.9906 687	2.0281 687
¾	....	....	....	....	....	....	0.9723 942	1.3209 111	1.3584 111
1	0.9638 554	1.0000 000	1.0375 000	0.9635 291	0.9907 121	1.0282 121	0.9633 627	0.9860 469	1.0235 469
¼	....	....	....	....	....	....	0.9544 151	0.7851 598	0.8226 598
½	....	....	....	0.9457 953	0.6543 215	0.6918 215	0.9455 505	0.6512 118	0.6887 118
¾	....	....	....	....	....	....	0.9367 683	0.5555 571	0.5930 571
2	0.9290 173	0.4907 976	0.5282 976	0.9283 880	0.4861 547	0.5236 547	0.9280 677	0.4838 234	0.5213 234
¼	....	....	....	....	....	....	0.9194 479	0.4280 369	0.4655 369
½	....	....	....	0.9113 011	0.3852 786	0.4227 786	0.9109 081	0.3834 137	0.4209 137
¾	....	....	....	....	....	....	0.9024 477	0.3469 090	0.3844 090
3	0.8954 384	0.3211 400	0.3586 400	0.8945 286	0.3180 469	0.3555 469	0.8940 658	0.3164 932	0.3539 932
¼	....	....	....	....	....	....	0.8857 617	0.2907 614	0.3282 614
½	....	....	....	0.8780 650	0.2700 408	0.3075 408	0.8775 349	0.2687 096	0.3062 096
¾	....	....	....	....	....	....	0.8693 844	0.2496 020	0.2871 020
4	0.8630 731	0.2363 687	0.2738 687	0.8619 043	0.2340 508	0.2715 508	0.8613 097	0.2328 865	0.2703 865
¼	....	....	....	....	....	....	0.8533 099	0.2181 409	0.2556 409
½	....	....	....	0.8460 410	0.2060 713	0.2435 713	0.8453 844	0.2050 369	0.2425 369
¾	....	....	....	....	....	....	0.8375 325	0.1933 154	0.2308 154
5	0.8318 777	0.1855 519	0.2230 519	0.8304 697	0.1836 994	0.2211 994	0.8297 535	0.1827 689	0.2202 689
¼	....	....	....	....	....	....	0.8220 469	0.1732 296	0.2107 296
½	....	....	....	0.8151 850	0.1654 056	0.2029 056	0.8144 118	0.1645 602	0.2020 602
¾	....	....	....	....	....	....	0.8068 475	0.1566 472	0.1941 472
6	0.8018 098	0.1517 122	0.1892 122	0.8001 816	0.1501 704	0.1876 704	0.7993 536	0.1493 960	0.1868 960
¼	....	....	....	....	....	....	0.7919 293	0.1427 272	0.1802 272
½	....	....	....	0.7854 543	0.1372 879	0.1747 879	0.7845 739	0.1365 736	0.1740 736
¾	....	....	....	....	....	....	0.7772 868	0.1308 780	0.1683 780
7	0.7728 287	0.1275 737	0.1650 737	0.7709 981	0.1262 541	0.1637 541	0.7700 675	0.1255 913	0.1630 913
¼	....	....	....	....	....	....	0.7629 151	0.1206 712	0.1581 712
½	....	....	....	0.7568 079	0.1166 991	0.1541 991	0.7558 292	0.1160 810	0.1535 810
¾	....	....	....	....	....	....	0.7488 092	0.1117 889	0.1492 889
8	0.7448 952	0.1094 984	0.1469 984	0.7428 789	0.1083 457	0.1458 457	0.7418 542	0.1077 668	0.1452 668
¼	....	....	....	....	....	....	0.7349 640	0.1039 902	0.1414 902
½	....	....	....	0.7292 063	0.1009 818	0.1384 818	0.7281 376	0.1004 375	0.1379 375
¾	....	....	....	....	....	....	0.7213 748	0.0970 894	0.1345 894
9	0.7179 713	0.0954 652	0.1329 652	0.7157 853	0.0944 425	0.1319 425	0.7146 747	0.0939 289	0.1314 289
¼	....	....	....	....	....	....	0.7080 369	0.0909 409	0.1284 409
½	....	....	....	0.7026 114	0.0885 976	0.1260 976	0.7014 607	0.0881 116	0.1256 116
¾	....	....	....	....	....	....	0.6949 455	0.0854 289	0.1229 289
10	0.6920 205	0.0842 614	0.1217 614	0.6896 799	0.0833 430	0.1208 430	0.6884 910	0.0828 817	0.1203 817
¼	....	....	....	....	....	....	0.6820 963	0.0804 603	0.1179 603
½	....	....	....	0.6769 864	0.0785 942	0.1160 942	0.6757 610	0.0781 554	0.1156 554
¾	....	....	....	....	....	....	0.6694 846	0.0759 592	0.1134 592
11	0.6670 077	0.0751 152	0.1126 152	0.6645 265	0.0742 823	0.1117 823	0.6632 665	0.0738 640	0.1113 640
¼	....	....	....	....	....	....	0.6571 061	0.0718 633	0.1093 633
½	....	....	....	0.6522 960	0.0703 503	0.1078 503	0.6510 030	0.0699 508	0.1074 508
¾	....	....	....	....	....	....	0.6449 565	0.0681 209	0.1056 209
12	0.6428 990	0.0675 123	0.1050 123	0.6402 905	0.0667 508	0.1042 508	0.6389 662	0.0663 684	0.1038 684
¼	....	....	....	....	....	....	0.6330 315	0.0646 886	0.1021 886
½	....	....	....	0.6285 060	0.0634 438	0.1009 438	0.6271 520	0.0630 772	0.1005 772
¾	....	....	....	....	....	....	0.6213 271	0.0615 300	0.0990 300
13	0.6196 616	0.0610 964	0.0985 964	0.6169 385	0.0603 955	0.0978 955	0.6155 562	0.0600 435	0.0975 435
¼	....	....	....	....	....	....	0.6098 390	0.0586 141	0.0961 141
½	....	....	....	0.6055 837	0.0575 772	0.0950 772	0.6041 748	0.0572 388	0.0947 388
¾	....	....	....	....	....	....	0.5985 633	0.0559 145	0.0934 145
14	0.5972 642	0.0556 132	0.0931 132	0.5944 381	0.0549 643	0.0924 643	0.5930 039	0.0546 385	0.0921 385
¼	....	....	....	....	....	....	0.5874 961	0.0534 082	0.0909 082
½	....	....	....	0.5834 974	0.0525 355	0.0900 355	0.5820 395	0.0522 214	0.0897 214
¾	....	....	....	....	....	....	0.5766 335	0.0510 757	0.0885 757
15	0.5756 764	0.0508 759	0.0883 759	0.5727 582	0.0502 723	0.0877 723	0.5712 778	0.0499 692	0.0874 692
¼	....	....	....	....	....	....	0.5659 718	0.0488 999	0.0863 999
½	....	....	....	0.5622 167	0.0481 588	0.0856 588	0.5607 151	0.0478 660	0.0853 660
¾	....	....	....	....	....	....	0.5555 072	0.0468 658	0.0843 658
16	0.5548 688	0.0467 448	0.0842 448	0.5518 691	0.0461 809	0.0836 809	0.5503 477	0.0458 978	0.0833 978
17	0.5348 133	0.0431 128	0.0806 128	0.5317 419	0.0425 840	0.0800 840	0.5301 845	0.0423 186	0.0798 186
18	0.5154 827	0.0398 966	0.0773 966	0.5123 487	0.0393 992	0.0768 992	0.5107 599	0.0391 495	0.0766 495
19	0.4968 508	0.0370 306	0.0745 306	0.4936 628	0.0365 613	0.0740 613	0.4920 471	0.0363 257	0.0738 257
20	0.4788 923	0.0344 621	0.0719 621	0.4756 584	0.0340 183	0.0715 183	0.4740 198	0.0337 955	0.0712 955
21	0.4615 829	0.0321 486	0.0696 486	0.4583 106	0.0317 279	0.0692 279	0.4566 529	0.0315 107	0.0690 107
22	0.4448 993	0.0300 553	0.0675 553	0.4415 955	0.0296 556	0.0671 556	0.4399 225	0.0294 550	0.0669 550
23	0.4288 186	0.0281 534	0.0656 534	0.4254 900	0.0277 730	0.0652 730	0.4238 049	0.0275 821	0.0650 821
24	0.4133 191	0.0264 189	0.0639 189	0.4099 720	0.0260 563	0.0635 563	0.4082 778	0.0258 743	0.0633 743
25	0.3983 799	0.0248 317	0.0623 317	0.3950 198	0.0244 855	0.0619 855	0.3933 196	0.0243 118	0.0618 118

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0375.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.01875.			RATIO *of* INTEREST: *QUARTERLY*, 0.009375.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	2.6042 984	42.781 290	16.427 18	2.6273 403	43.395 742	16.516 98	2.6391 531	43.710 748	16.562 41
27	2.7019 596	45.385 588	16.797 29	2.7267 893	46.047 714	16.887 16	2.7395 218	46.387 247	16.932 61
28	2.8032 830	48.087 548	17.154 01	2.8300 025	48.800 066	17.243 82	2.8437 075	49.165 534	17.289 24
29	2.9084 062	50.890 831	17.497 84	2.9371 225	51.656 600	17.587 49	2.9518 556	52.049 482	17.632 80
30	3.0174 714	53.799 237	17.829 24	3.0482 972	54.621 258	17.918 61	3.0641 166	55.043 108	17.963 78
31	3.1306 266	56.816 709	18.148 67	3.1636 800	57.698 133	18.237 66	3.1806 469	58.150 584	18.282 68
32	3.2480 251	59.947 335	18.456 55	3.2834 302	60.891 473	18.545 08	3.3016 090	61.376 239	18.589 80
33	3.3698 260	63.195 360	18.753 30	3.4077 132	64.205 685	18.841 28	3.4271 713	64.724 567	18.885 71
34	3.4961 945	66.565 186	19.039 33	3.5367 005	67.645 346	19.126 68	3.5575 088	68.200 235	19.170 78
35	3.6273 018	70.061 381	19.315 01	3.6705 701	71.215 203	19.401 67	3.6928 032	71.808 085	19.445 41
36	3.7633 256	73.688 682	19.580 73	3 8095 069	74.920 184	19.666 64	3.8332 429	75.553 143	19.709 98
37	3.9044 503	77.452 008	19.836 85	3.9537 027	78.765 405	19.921 94	3.9790 236	79.440 629	19.964 86
38	4.0508 672	81.356 458	20.083 71	4.1033 565	82.756 174	20.167 92	4.1303 484	83.475 958	20.210 39
39	4,2027 747	85 407 326	20.321 65	4.2586 750	86.898 000	20.404 94	4.2874 283	87.664 753	20.446 93
40	4.3603 788	89.610 100	20.550 99	4.4198 725	91.196 600	20.633 31	4.4504 819	92.012 851	20.674 81
41	4.5238 930	93.970 479	20.772 04	4.5871 716	95.657 908	20.853 35	4.6197 366	96.526 310	20.894 33
42	4.6935 389	98.494 372	20.985 10	4.7608 032	100.28 808	21.065 37	4.7954 282	101.21 142	21.105 82
43	4.8695 467	103.18 791	21.190 46	4.9410 070	105.09 352	21.269 66	4.9778 015	106.07 471	21.309 55
44	5.0521 547	108.05 746	21.388 39	5.1280 318	110 08 085	21.466 49	5.1671 105	111.12 295	21 505 82
45	5.2416 105	113.10 961	21.579 17	5.3221 359	115.25 696	21.656 15	5.3636 190	116.36 317	21.694 90
46	5.4381 709	118.35 122	21.763 06	5.5235 870	120.62 899	21.838 89	5.3676 009	121.80 269	21.877 05
47	5.6421 023	123.78 939	21.940 30	5.7326 634	126.20 436	22 014 96	5.7793 404	127.44 908	22.052 51
48	5.8536 811	129.43 150	22.111 13	5.9496 537	131.99 077	22.184 61	5.9991 324	133.31 020	22.221 56
49	6.0731 941	135.28 518	22.275 79	6.1748 574	137.99 620	22.348 08	6.2272 833	139.39 422	22.384 44
50	6.3009 389	141.35 837	22.434 49	6.4085 854	144.22 894	22.505 58	6.4641 110	145.70 963	22.541 33
51	6.5372 241	147.65 931	22.587 46	6.6511 604	150.69 761	22.657 34	6.7099 453	152.26 521	22.692 46
52	6.7823 700	154.19 653	22.734 90	6.9029 172	157.41 112	22.803 56	6.9651 288	159.07 010	22.838 07
53	7.0367 089	160.97 890	22.877 02	7.1642 034	164.37 876	22.944 46	7.2300 172	166.13 379	22.978 34
54	7.3005 855	168.01 561	23.013 99	7.4353 797	171.61 012	23.080 21	7.5049 794	173.46 612	23.113 47
55	7.5743 574	175.31 620	23.146 02	7.7168 204	179.11 521	23.211 01	7.7903 987	181.07 730	23.243 65
56	7.8583 958	182.89 056	23.273 27	8.0089 141	186.90 438	23 337 04	8.0866 726	188.97 794	23.369 06
57	8.1530 857	190.74 895	23.395 92	8.3120 640	194.98 837	23.458 48	8.3942 140	197.17 904	23.489 88
58	8.4588 264	198.90 204	23.514 14	8.6266 886	203.37 836	23.575 48	8.7134 513	205.69 204	23.606 27
59	8.7760 324	207.36 086	23.628 09	8.9532 223	212.08 593	23.688 22	9.0448 295	214.52 879	23.718 39
60	9.1051 336	216.13 690	23.737 92	9.2921 157	221.12 309	23.796 85	9.3888 103	223.70 161	23.826 41
61	9.4465 761	225.24 203	23.843 77	9.6438 368	230.50 232	23.901 52	9.7458 728	233.22 327	23.930 47
62	9.8008 227	234.68 861	23.945 81	10.008 871	240.23 656	24.002 36	10.116 515	243.10 706	24.030 71
63	10.168 354	244.48 943	24.044 15	10.387 723	250.33 927	24.099 53	10.501 252	253.36 673	24.127 29
64	10.549 667	254.65 778	24.138 94	10.780 914	260.82 437	24.193 16	10.900 622	264.01 658	24.220 32
65	10.945 279	265.20 745	24.230 30	11.188 988	271.70 636	24.283 37	11.315 179	275.07 145	24.309 95
66	11.355 727	276.15 273	24.318 37	11.612 509	283.00 025	24.370 29	11.745 503	286.54 675	24.396 30
67	11.781 567	287.50 846	24.403 24	12.052 061	294.72 162	24.454 04	12.192 192	298.45 845	24.479 47
68	12.223 376	299.29 002	24.485 05	12.508 250	306.88 667	24.534 74	12.655 869	310.82 317	24.559 61
69	12.681 752	311.51 340	24.563 91	12.981 707	319.51 219	24.612 49	13.137 180	323.65 813	24.636 80
70	13.157 318	324.19 515	24.639 91	13.473 085	332.61 560	24.687 41	13.636 795	336.98 121	24.711 17
71	13.650 718	337.35 247	24.713 17	13.983 062	346.21 499	24.759 60	14.155 412	350.81 097	24.782 82
72	14.162 620	351.00 319	24.783 78	14.512 343	360.32 914	24.829 15	14.693 751	365.16 669	24.851 84
73	14.693 718	365.16 581	24.851 83	15.061 658	374.97 754	24.896 17	15.252 564	380.06 837	24.918 33
74	15.244 732	379.85 952	24.917 43	15.631 765	390.18 040	24.960 74	15.832 629	395.53 677	24 982 38
75	15.816 410	395.10 426	24.980 65	16.223 452	405.95 871	25.022 95	16.434 754	411.59 344	25.044 09
76	16.409 525	410.92 067	25.041 59	16.837 535	422.33 426	25.082 90	17.059 778	428.26 075	25.103 54
77	17.024 882	427.33 019	25.100 33	17.474 862	439.32 965	25.140 67	17.708 573	445.56 194	25.160 80
78	17.663 315	444.35 507	25.156 95	18.136 313	456.96 834	25.196 32	18.382 041	463.52 109	25.215 98
79	18.325 690	462.01 839	25.211 51	18.822 800	475.27 468	25.249 94	19.081 122	482.16 325	25.269 12
80	19.012 903	480.34 408	25.264 11	19.535 273	494.27 394	25.301 62	19.806 789	501.51 438	25.320 33
81	19.725 887	499.35 698	25.314 81	20.274 713	513.99 236	25.351 40	20.560 054	521.60 145	25.369 65
82	20.465 608	519.08 287	25.363 67	21.042 143	534.45 715	25.399 37	21.341 967	542.45 244	25.417 17
83	21.233 068	539.54 848	25.410 76	21.838 621	555.69 656	25.445 59	22.153 615	564.09 641	25.462 95
84	22.029 308	560.78 154	25.456 16	22.665 247	577.73 992	25.490 12	22.996 132	586.56 351	25.507 05
85	22.855 407	582.81 085	25.499 91	23.523 162	600.61 765	25.533 04	23.870 690	609.88 505	25.549 54
86	23.712 485	605.66 626	25.542 08	24.413 550	624.36 134	25.574 38	24.778 507	634.09 353	25.590 47
87	24.601 703	629.37 874	25.582 73	25.337 641	649.00 377	25.614 21	25.720 850	659 22 267	25.629 89
88	25.524 267	653.98 045	25.621 91	26.296 711	674.57 895	25.652 60	26.699 031	685.30 748	25.667 88
89	26.481 427	679.50 471	25.659 67	27.292 082	701.12 219	25.689 58	27.714 412	712.38 432	25.704 47
90	27.474 480	705.98 614	25.696 07	28.325 131	728.67 014	25.725 22	28.768 409	740.49 091	25.739 73
91	28.504 773	733.46 062	25.731 15	29.397 281	757.26 082	25.759 55	29.862 490	769.66 640	25.773 68
92	29.573 702	761.96 539	25.764 96	30.510 014	786.93 370	25 792 64	30.998 180	799.95 147	25.806 40
93	30.682 716	791.53 909	25.797 56	31.664 866	817.72 974	25.824 52	32.177 061	831.38 829	25.837 92
94	31,833 318	822.22 181	25.828 97	32.863 430	849.69 147	25.855 23	33.400 775	864.02 068	25.868 28
95	33.027 067	854.05 513	25.859 25	34.107 362	882.86 299	25.884 82	34.671 028	897.89 409	25.897 53
96	34.265 582	887.08 220	25.888 43	35.398 379	917.29 011	25.913 34	35.989 590	933.05 574	25.925 71
97	35.550 542	921.34 778	25.916 56	36.738 263	953.02 036	25.940 81	37.358 297	969.55 460	25.952 86
98	36.883 687	956.89 832	25.943 67	38.128 864	990.10 303	25.967 28	38.779 058	1007.4 415	25.979 01
99	38.266 825	993.78 201	25.969 81	39.572 101	1028.5 894	25.992 79	40.253 850	1046.7 693	26.004 20
100	39.701 831	1032.0 488	25.994 99	41.069 967	1068.5 394	26.017 37	41.784 730	1087.5 928	26 028 48
	Value of Perpetual Ann.		26.666 67	. . . .		26.666 67	. . . .		26.666 67

PERPETUAL STOCK: 3 p.C. 80; 3½ p.C. 93,3333; 4 p.C. 106,6667; 5 p.C. 133,3333.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0375.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.01875.			RATIO *of* INTEREST: *QUARTERLY*, 0.009375.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.3839 806	0.0233 747	0.0608 747	0.3806 130	0.0230 438	0.0605 438	0.3789 094	0.0228 777	0.0603 777
27	0.3701 017	0.0220 334	0.0595 334	0.3667 317	0.0217 166	0.0592 166	0.3650 272	0.0215 577	0.0590 577
28	0.3567 246	0.0207 954	0.0582 954	0.3533 566	0.0204 918	0.0579 918	0.3516 536	0.0203 395	0.0578 395
29	0.3438 309	0.0196 499	0.0571 499	0.3404 693	0.0193 586	0.0568 586	0.3387 700	0.0192 125	0.0567 125
30	0.3314 033	0.0185 876	0.0560 876	0.3280 520	0.0183 079	0.0558 079	0.3263 584	0.0181 676	0.0556 676
31	0.3194 249	0.0176 005	0.0551 005	0.3160 876	0.0173 316	0.0548 316	0.3144 015	0.0171 967	0.0546 967
32	0.3078 794	0.0166 813	0.0541 813	0.3045 595	0.0164 227	0.0539 227	0.3028 826	0.0162 929	0.0537 929
33	0.2967 512	0.0158 239	0.0533 239	0.2934 519	0.0155 749	0.0530 749	0.2917 858	0.0154 501	0.0529 501
34	0.2860 253	0.0150 229	0.0525 229	0.2827 494	0.0147 830	0.0522 830	0.2810 956	0.0146 627	0.0521 627
35	0.2756 870	0.0142 732	0.0517 732	0.2724 372	0.0140 419	0.0515 419	0.2707 970	0.0139 259	0.0514 259
36	0.2657 224	0.0135 706	0.0510 706	0.2625 011	0.0133 475	0.0508 475	0.2608 757	0.0132 357	0.0507 357
37	0.2561 182	0.0129 112	0.0504 112	0.2529 275	0.0126 959	0.0501 959	0.2513 179	0.0125 880	0.0500 880
38	0.2468 607	0.0122 916	0.0497 916	0.2437 029	0.0120 837	0.0495 837	0.2421 103	0.0119 795	0.0494 795
39	0.2379 380	0.0117 086	0.0492 086	0.2348 148	0.0115 077	0.0490 077	0.2332 401	0.0114 071	0.0489 071
40	0.2293 379	0.0111 595	0.0486 595	0.2262 509	0.0109 653	0.0484 653	0.2246 948	0.0108 680	0.0483 680
41	0.2210 486	0.0106 416	0.0481 416	0.2179 993	0.0104 539	0.0479 539	0.2164 625	0.0103 599	0.0478 599
42	0.2130 589	0.0101 529	0.0476 529	0.2100 486	0.0099 713	0.0474 713	0.2085 320	0.0098 803	0.0473 803
43	0.2053 579	0.0096 911	0.0471 911	0.2023 879	0.0095 153	0.0470 153	0.2008 919	0.0094 273	0.0469 273
44	0.1979 354	0.0092 543	0.0467 543	0.1950 066	0.0090 842	0.0465 842	0.1935 318	0.0089 990	0.0464 990
45	0.1907 811	0.0088 410	0.0463 410	0.1878 945	0.0086 763	0.0461 763	0.1864 413	0.0085 938	0.0460 938
46	0.1838 854	0.0084 494	0.0459 494	0.1810 418	0.0082 899	0.0457 899	0.1796 106	0.0082 100	0.0457 100
47	0.1772 389	0.0080 782	0.0455 782	0.1744 390	0.0079 237	0.0454 237	0.1730 301	0.0078 463	0.0453 463
48	0.1708 327	0.0077 261	0.0452 261	0.1680 770	0.0075 763	0.0450 763	0.1666 908	0.0075 013	0.0450 013
49	0.1646 580	0.0073 918	0.0448 918	0.1619 471	0.0072 466	0.0447 466	0.1605 837	0.0071 739	0.0446 739
50	0.1587 065	0.0070 742	0.0445 742	0.1560 407	0.0069 334	0.0444 334	0.1547 003	0.0068 630	0.0443 630
51	0.1529 701	0.0067 723	0.0442 723	0.1503 497	0.0066 358	0.0441 358	0.1490 325	0.0065 675	0.0440 675
52	0.1474 411	0.0064 852	0.0439 852	0.1448 663	0.0063 528	0.0438 528	0.1435 724	0.0062 865	0.0437 865
53	0.1421 119	0.0062 120	0.0437 120	0.1395 829	0.0060 835	0.0435 835	0.1383 123	0.0060 192	0.0435 192
54	0.1369 753	0.0059 518	0.0434 518	0.1344 921	0.0058 272	0.0433 272	0.1332 449	0.0057 648	0.0432 648
55	0.1320 244	0.0057 040	0.0432 040	0.1295 871	0.0055 830	0.0430 830	0.1283 631	0.0055 225	0.0430 225
56	0.1272 524	0.0054 678	0.0429 678	0.1248 609	0.0053 503	0.0428 503	0.1236 603	0.0052 916	0.0427 916
57	0.1226 599	0.0052 425	0.0427 425	0.1203 071	0.0051 285	0.0426 285	0.1191 297	0.0050 715	0.0425 715
58	0.1182 197	0.0050 276	0.0425 276	0.1159 193	0.0049 169	0.0424 169	0.1147 651	0.0048 616	0.0423 616
59	0.1139 467	0.0048 225	0.0423 225	0.1116 916	0.0047 151	0.0422 151	0.1106 604	0.0046 614	0.0421 614
60	0.1098 282	0.0046 267	0.0421 267	0.1076 181	0.0045 224	0.0420 224	0.1065 098	0.0044 702	0.0419 702
61	0.1058 584	0.0044 397	0.0419 397	0.1036 932	0.0043 384	0.0418 384	0.1026 075	0.0042 877	0.0417 877
62	0.1020 322	0.0042 610	0.0417 610	0.0999 114	0.0041 626	0.0416 626	0.0988 483	0.0041 134	0.0416 134
63	0.0983 443	0.0040 902	0.0415 902	0.0962 675	0.0039 946	0.0414 946	0.0952 267	0.0039 468	0.0414 468
64	0.0947 897	0.0039 268	0.0414 268	0.0927 565	0.0038 340	0.0413 340	0.0917 379	0.0037 876	0.0412 876
65	0.0913 636	0.0037 706	0.0412 706	0.0893 736	0.0036 804	0.0411 804	0 0883 769	0.0036 354	0.0411 354
66	0.0880 613	0.0036 212	0.0411 212	0.0861 140	0.0035 336	0.0410 336	0.0851 390	0.0034 898	0.0409 898
67	0.0848 784	0.0034 782	0.0409 782	0.0829 734	0.0033 930	0.0408 930	0.0820 197	0.0033 506	0.0408 506
68	0.0818 106	0.0033 412	0.0408 412	0.0799 472	0.0032 585	0.0407 585	0.0790 147	0.0032 173	0.0407 173
69	0.0788 535	0.0032 101	0.0407 101	0.0770 315	0.0031 298	0.0406 298	0.0761 198	0.0030 897	0.0405 897
70	0.0760 033	0.0030 846	0.0405 846	0.0742 220	0.0030 065	0.0405 065	0.0733 310	0.0029 675	0.0404 675
71	0.0732 562	0.0029 643	0.0404 643	0.0715 151	0.0028 884	0.0403 884	0.0706 444	0.0028 505	0.0403 505
72	0.0706 084	0.0028 490	0.0403 490	0.0689 069	0.0027 752	0.0402 752	0.0680 561	0.0027 385	0.0402 385
73	0.0680 563	0.0027 385	0.0402 385	0.0663 938	0.0026 668	0.0401 668	0.0655 628	0.0026 311	0.0401 311
74	0.0655 964	0.0026 326	0.0401 326	0.0639 723	0.0025 629	0.0400 629	0.0631 607	0.0025 282	0.0400 282
75	0.0632 255	0.0025 310	0.0400 310	0.0616 392	0.0024 633	0.0399 633	0.0608 467	0.0024 296	0.0399 296
76	0.0609 402	0.0024 336	0.0399 336	0.0593 911	0.0023 678	0.0398 678	0.0586 174	0.0023 350	0.0398 350
77	0.0587 376	0.0023 401	0.0398 401	0.0572 251	0.0022 762	0.0397 762	0.0564 698	0.0022 444	0.0397 444
78	0.0566 145	0.0022 505	0.0397 505	0.0551 380	0.0021 883	0.0396 883	0.0544 009	0.0021 574	0.0396 574
79	0.0545 682	0.0021 644	0.0396 644	0.0531 271	0.0021 040	0.0396 040	0.0524 078	0.0020 740	0.0395 740
80	0.0525 959	0.0020 818	0.0395 818	0.0511 895	0.0020 232	0.0395 232	0.0504 877	0.0019 940	0.0394 940
81	0.0506 948	0.0020 026	0.0395 026	0.0493 225	0.0019 456	0.0394 456	0.0486 380	0.0019 172	0.0394 172
82	0.0488 625	0.0019 265	0.0394 265	0.0475 237	0.0018 711	0.0393 711	0.0468 560	0.0018 435	0.0393 435
83	0.0470 964	0.0018 534	0.0393 534	0.0457 904	0.0017 995	0.0392 995	0.0451 394	0.0017 727	0.0392 727
84	0.0453 941	0.0017 832	0.0392 832	0.0441 204	0.0017 309	0.0392 309	0.0434 856	0.0017 048	0.0392 048
85	0.0437 533	0.0017 158	0.0392 158	0.0425 113	0.0016 650	0.0391 650	0.0418 924	0.0016 397	0.0391 397
86	0.0421 719	0.0016 511	0.0391 511	0.0409 609	0.0016 016	0.0391 016	0.0403 576	0.0015 771	0.0390 771
87	0.0406 476	0.0015 889	0.0390 889	0.0394 670	0.0015 408	0.0390 408	0.0388 790	0.0015 169	0.0390 169
88	0.0391 784	0.0015 291	0.0390 291	0.0380 276	0.0014 824	0.0389 824	0.0374 545	0.0014 592	0.0389 592
89	0.0377 623	0.0014 717	0.0389 717	0.0366 407	0.0014 263	0.0389 263	0.0360 823	0.0014 037	0.0389 037
90	0.0363 974	0.0014 165	0.0389 165	0.0353 043	0.0013 724	0.0388 724	0.0347 603	0.0013 506	0.0388 506
91	0.0350 819	0.0013 634	0.0388 634	0.0340 168	0.0013 205	0.0388 205	0.0334 868	0.0012 993	0.0387 993
92	0.0338 138	0.0013 124	0.0388 124	0.0327 761	0.0012 708	0.0387 708	0.0322 600	0.0012 501	0.0387 501
93	0.0325 916	0.0012 634	0.0387 634	0.0315 807	0.0012 229	0.0387 229	0.0310 780	0.0012 028	0.0387 028
94	0.0314 136	0.0012 162	0.0387 162	0.0304 290	0.0011 769	0.0386 769	0.0299 394	0.0011 574	0.0386 574
95	0.0302 782	0.0011 709	0.0386 709	0.0293 192	0.0011 327	0.0386 327	0.0288 425	0.0011 137	0.0386 137
96	0.0291 838	0.0011 273	0.0386 273	0.0282 499	0 0010 902	0.0385 902	0.0277 858	0.0010 717	0.0385 717
97	0.0281 290	0.0010 854	0.0385 854	0.0272 196	0.0010 493	0.0385 493	0.0267 678	0.0010 314	0.0385 314
98	0.0271 123	0.0010 450	0.0385 450	0.0262 268	0.0010 100	0.0385 100	0.0257 871	0.0009 926	0.0384 926
99	0.0261 323	0.0010 063	0.0385 063	0.0252 703	0.0009 722	0.0384 722	0.0248 483	0.0009 553	0.0384 553
100	0.0251 878	0.0009 689	0.0384 689	0.0243 487	0.0009 359	0.0384 359	0.0239 322	0.0009 195	0.0384 195
	Ratio of Perpetual Ann.		0.0375 000	- - - - - - - - - - -		0.0375 000	- - - - - - - - - -		0.0375 000

RATE OF INTEREST: 4 *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY,* 0.04.			RATIO *of* INTEREST: *HALF-YEARLY,* 0.02.			RATIO *of* INTEREST: *QUARTERLY,* 0.01.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
0¼	....	....	....	....	....	....	1.0100 000	0.2500 000	0.2475 25
½	....	....	....	1.0200 000	0.5000 000	0.4901 96	1.0201 000	0.5025 000	0.4925 99
¾	....	....	....	....	....	....	1.0303 010	0.7575 250	0.7352 46
1	1.0400 000	1.0000 000	0.9615 38	1.0404 000	1.0100 000	0.9707 80	1.0406 040	1.0151 003	0.9754 91
¼	....	....	....	....	....	....	1.0510 101	1.2752 513	1.2133 58
½	....	....	....	1.0612 080	1.5302 000	1.4419 42	1.0615 202	1.5380 038	1.4488 69
¾	....	....	....	....	....	....	1.0721 354	1.8033 838	1.6820 49
2	1.0816 000	2.0400 000	1.8860 95	1.0824 322	2.0608 040	1.9038 64	1.0828 567	2.0714 176	1.9129 19
¼	....	....	....	....	....	....	1.0936 853	2.3421 318	2.1415 04
½	....	....	....	1.1040 808	2.6020 201	2.3567 30	1.1046 221	2.6155 531	2.3678 26
¾	....	....	....	....	....	....	1.1156 683	2.8917 087	2.5919 07
3	1.1248 640	3.1216 000	2.7750 91	1.1261 624	3.1540 605	2.8007 15	1.1268 250	3.1706 258	2.8137 69
¼	....	....	....	....	....	....	1.1380 933	3.4523 320	3.0334 35
½	....	....	....	1.1486 857	3.7171 417	3.2359 95	1.1494 742	3.7368 553	3.2509 26
¾	....	....	....	....	....	....	1.1609 690	4.0242 239	3.4662 63
4	1.1698 586	4.2464 640	3.6298 95	1.1716 594	4.2914 845	3.6627 41	1.1725 786	4.3144 661	3.6794 68
¼	....	....	....	....	....	....	1.1843 044	4.6076 108	3.8905 63
½	....	....	....	1.1950 926	4.8773 142	4.0811 18	1.1961 475	4.9036 869	4.0995 67
¾	....	....	....	....	....	....	1.2081 090	5.2027 238	4.3065 02
5	1.2166 529	5.4163 226	4.4518 22	1.2189 944	5.4748 605	4.4912 92	1.2201 900	5.5047 510	4.5113 88
¼	....	....	....	....	....	....	1.2323 919	5.8097 985	4.7142 46
½	....	....	....	1.2433 743	6.0843 577	4.8934 24	1.2447 159	6.1178 964	4.9150 95
¾	....	....	....	....	....	....	1.2571 630	6.4290 755	5.1139 55
6	1.2653 190	6.6329 755	5.2421 37	1.2682 418	6.7060 449	5.2876 71	1.2697 346	6.7433 662	5.3108 47
¼	....	....	....	....	....	....	1.2824 320	7.0607 998	5.5057 89
½	....	....	....	1.2936 066	7.3401 658	5.6741 87	1.2952 563	7.3814 079	5.6988 01
¾	....	....	....	....	....	....	1.3082 089	7.7052 219	5.8899 02
7	1.3159 318	7.8982 945	6.0020 55	1.3194 788	7.9869 691	6.0531 24	1.3212 910	8.0322 742	6.0791 11
¼	....	....	....	....	....	....	1.3345 039	8.3625 969	6.2664 46
½	....	....	....	1.3458 683	8.6467 085	6.4246 32	1.3478 489	8.6962 229	6.4519 27
¾	....	....	....	....	....	....	1.3613 274	9.0331 851	6.6355 71
8	1.3685 691	9.2142 263	6.7327 45	1.3727 857	9.3196 426	6.7888 55	1.3749 407	9.3735 170	6.8173 97
¼	....	....	....	....	....	....	1.3886 901	9.7172 521	6.9974 23
½	....	....	....	1.4002 414	10.006 035	7.1459 36	1.4025 770	10.064 425	7.1756 66
¾	....	....	....	....	....	....	1.4166 028	10.415 069	7.3521 45
9	1.4233 118	10.582 795	7.4353 32	1.4282 462	10.706 156	7.4960 16	1.4307 688	10.769 220	7.5268 76
¼	....	....	....	....	....	....	1.4450 765	11.126 912	7.6998 77
½	....	....	....	1.4568 112	11.420 279	7.8392 31	1.4595 272	11.488 181	7.8711 66
¾	....	....	....	....	....	....	1.4741 225	11.853 063	8.0407 58
10	1.4802 443	12.006 107	8.1108 96	1.4859 474	12.148 685	8.1757 17	1.4888 637	12.221 593	8.2086 71
¼	....	....	....	....	....	....	1.5037 524	12.593 809	8.3749 22
½	....	....	....	1.5156 663	12.891 659	8.5056 05	1.5187 899	12.969 747	8.5395 27
¾	....	....	....	....	....	....	1.5339 778	13.349 445	8.7025 02
11	1.5394 541	13.486 351	8.7604 77	1.5459 797	13.649 492	8.8290 24	1.5493 176	13.732 939	8.8638 63
¼	....	....	....	....	....	....	1.5648 107	14.120 269	9.0236 27
½	....	....	....	1.5768 993	14.422 482	9.1461 02	1.5804 589	14.511 471	9.1818 09
¾	....	....	....	....	....	....	1.5962 634	14.906 586	9.3384 25
12	1.6010 322	15.025 805	9.3850 74	1.6084 372	15.210 931	9.4569 63	1.6122 261	15.305 652	9.4934 90
¼	....	....	....	....	....	....	1.6283 483	15.708 708	9.6470 20
½	....	....	....	1.6406 062	16.015 150	9.7617 28	1.6446 318	16.115 796	9.7990 29
¾	....	....	....	....	....	....	1.6610 781	16.526 953	9.9495 34
13	1.6650 735	16.626 838	9.9856 48	1.6734 181	16.835 453	10.060 52	1.6776 889	16.942 223	10.098 56
¼	....	....	....	....	....	....	1.6944 658	17.361 645	10.246 09
½	....	....	....	1.7068 865	17.672 162	10.353 45	1.7114 105	17.785 262	10.392 17
¾	....	....	....	....	....	....	1.7285 246	18.213 114	10.536 80
14	1.7316 764	18.291 911	10.563 12	1.7410 242	18.525 605	10.640 64	1.7458 098	18.645 245	10.680 00
¼	....	....	....	....	....	....	1.7632 679	19.081 698	10.821 78
½	....	....	....	1.7758 447	19.396 117	10.922 19	1.7809 006	19.522 515	10,962 16
¾	....	....	....	....	....	....	1.7987 096	19.967 740	11.101 15
15	1.8009 435	20.023 588	11.118 39	1.8113 616	20.284 040	11.198 23	1.8166 967	20.417 417	11.238 76
¼	....	....	....	....	....	....	1.8348 637	20.871 592	11.375 01
½	....	....	....	1.8475 888	21.189 720	11.468 85	1.8532 123	21.330 308	11.509 91
¾	....	....	....	....	....	....	1.8717 444	21.793 611	11.643 48
16	1.8729 812	21.824 531	11.652 30	1.8845 406	22.113 515	11.734 17	1.8904 619	22.261 547	11.775 72
17	1.9479 005	23.697 512	12.165 67	1.9606 760	24.016 901	12.249 30	1.9672 222	24.180 555	12.291 78
18	2.0258 165	25.645 413	12.659 30	2.0398 873	25.997 184	12.744 42	2.0470 993	26.177 483	12.787 60
19	2.1068 492	27.671 229	13.133 94	2.1222 988	28.057 470	13.220 32	2.1302 198	28.255 494	13.264 12
20	2.1911 231	29.778 079	13.590 33	2.2080 397	30.200 992	13.677 74	2.2167 152	30.417 880	13.722 05
21	2.2787 681	31.969 202	14.029 16	2.2972 445	32.431 112	14.117 39	2.3067 227	32.668 069	14.162 11
22	2.3699 188	34.247 970	14.451 12	2.3900 531	34.751 327	14.539 98	2.4003 849	35,009 623	14.585 00
23	2.4647 155	36.617 889	14.856 84	2.4866 113	37.165 282	14.946 16	2.4978 502	37.446 255	14.991 39
24	2.5633 042	39.082 604	15.246 96	2.5870 704	39.676 760	15.336 56	2.5992 729	39.981 823	15.381 93
25	2.6658 363	41.645 908	15.622 08	2.6915 880	42.289 701	15.711 80	2.7048 138	42.620 346	15.757 22

PERPETUAL STOCK: 3 *p.C.* 75; 3½ *p.C.* 87,5; 4 *p.C.* 100; 5 *p.C.* 125.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.04.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02.			RATIO *of* INTEREST: *QUARTERLY*, 0.01.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
0¼	....	....	....	....	....	....	0.9900 990	4.0000 000	4.0400 000
½	....	....	....	0.9803 921	2.0000 000	2.0400 000	0.9802 960	1.9900 497	2.0300 497
¾	....	....	....	....	....	....	0.9705 901	1.3200 885	1.3600 885
1	0.9615 384	1.0000 000	1.0400 000	0.9611 688	0.9900 990	1.0300 990	0.9609 804	0.9851 244	1.0251 244
¼	....	....	....	....	....	....	0.9514 657	0.7841 592	0.8241 592
½	....	....	....	0.9423 223	0.6535 094	0.6935 094	0.9420 453	0.6501 935	0.6901 935
¾	....	....	....	....	....	....	0.9327 181	0.5545 131	0.5945 131
2	0.9245 562	0.4901 961	0.5301 961	0.9238 453	0.4852 475	0.5252 475	0.9234 832	0.4827 611	0.5227 611
¼	....	....	....	....	....	....	0.9143 398	0.4269 614	0.4669 614
½	....	....	....	0.9057 308	0.3843 168	0.4243 168	0.9052 870	0.3823 283	0.4223 283
¾	....	....	....	....	....	....	0.8963 237	0.3456 163	0.3858 163
3	0.8889 963	0.3203 485	0.3603 485	0.8879 714	0.3170 516	0.3570 516	0.8874 492	0.3153 951	0.3553 951
¼	....	....	....	....	....	....	0.8786 625	0.2896 593	0.3296 593
½	....	....	....	0.8705 602	0.2690 239	0.3090 239	0.8699 629	0.2676 047	0.3076 047
¾	....	....	....	....	....	....	0.8613 494	0.2484 951	0.2884 951
4	0.8548 042	0.2354 900	0.2754 900	0.8534 904	0.2330 196	0.2730 196	0.8528 212	0.2317 784	0.2717 784
¼	....	....	....	....	....	....	0.8443 775	0.2170 322	0.2570 322
½	....	....	....	0.8367 553	0.2050 309	0.2450 309	0.8360 173	0.2039 282	0.2439 282
¾	....	....	....	....	....	....	0.8277 399	0.1922 070	0.2322 070
5	0.8219 271	0.1846 271	0.2246 271	0.8203 483	0.1826 531	0.2226 531	0.8195 444	0.1816 613	0.2216 613
¼	....	....	....	....	....	....	0.8114 301	0.1721 230	0.2121 230
½	....	....	....	0.8042 630	0.1643 559	0.2043 559	0.8033 962	0.1634 549	0.2034 549
¾	....	....	....	....	....	....	0.7954 418	0.1555 434	0.1955 434
6	0.7903 145	0.1507 619	0.1907 619	0.7884 932	0.1491 192	0.1891 192	0.7875 662	0.1482 939	0.1882 939
¼	....	....	....	....	....	....	0.7797 684	0.1416 270	0.1816 270
½	....	....	....	0.7730 326	0.1362 367	0.1762 367	0.7720 480	0.1354 755	0.1754 755
¾	....	....	....	....	....	....	0.7644 039	0.1297 821	0.1697 821
7	0.7599 178	0.1266 096	0.1666 096	0.7578 751	0.1252 040	0.1652 040	0.7568 356	0.1244 977	0.1644 977
¼	....	....	....	....	....	....	0.7493 422	0.1195 801	0.1595 801
½	....	....	....	0.7430 147	0.1156 509	0.1556 509	0.7419 229	0.1149 925	0.1549 925
¾	....	....	....	....	....	....	0.7345 771	0.1107 029	0.1507 029
8	0.7306 902	0.1085 278	0.1485 278	0.7284 458	0.1073 003	0.1473 003	0.7273 041	0.1066 835	0.1466 835
¼	....	....	....	....	....	....	0.7201 031	0.1029 098	0.1429 098
½	....	....	....	0.7141 626	0.0999 397	0.1399 397	0.7129 733	0.0993 599	0.1393 599
¾	....	....	....	....	....	....	0.7059 143	0.0960 147	0.1360 147
9	0.7025 867	0.0944 930	0.1344 930	0.7001 594	0.0934 042	0.1334 042	0.6989 249	0.0928 572	0.1328 572
¼	....	....	....	....	....	....	0.6920 049	0.0898 722	0.1298 722
½	....	....	....	0.6864 307	0.0875 635	0.1275 635	0.6851 533	0.0870 460	0.1270 460
¾	....	....	....	....	....	....	0.6783 697	0.0843 664	0.1243 664
10	0.6755 642	0.0832 909	0.1232 909	0.6729 713	0.0823 134	0.1223 134	0.6716 531	0.0818 224	0.1218 224
¼	....	....	....	....	....	....	0.6650 031	0.0794 041	0.1194 041
½	....	....	....	0.6597 758	0.0775 695	0.1175 695	0.6584 189	0.0771 025	0.1171 025
¾	....	....	....	....	....	....	0.6518 999	0.0749 095	0.1149 095
11	0.6495 810	0.0741 490	0.1141 490	0.6468 390	0.0732 628	0.1132 628	0.6454 454	0.0728 176	0.1128 176
¼	....	....	....	....	....	....	0.6390 550	0.0708 202	0.1108 202
½	....	....	....	0.6341 559	0.0693 362	0.1093 362	0.6327 277	0.0689 110	0.1089 110
¾	....	....	....	....	....	....	0.6264 630	0.0670 799	0.1070 799
12	0.6245 971	0.0665 522	0.1065 522	0.6217 215	0.0657 422	0.1057 422	0.6202 604	0.0653 353	0.1053 353
¼	....	....	....	....	....	....	0.6141 192	0.0636 590	0.1036 590
½	....	....	....	0.6095 309	0.0624 409	0.1024 409	0.6080 388	0.0620 509	0.1020 509
¾	....	....	....	....	....	....	0.6020 187	0.0605 072	0.1005 072
13	0.6005 741	0.0601 437	0.1001 437	0.5975 793	0.0593 985	0.0993 985	0.5960 581	0.0590 241	0.0990 241
¼	....	....	....	....	....	....	0.5901 565	0.0575 982	0.0975 982
½	....	....	....	0.5858 621	0.0565 862	0.0965 862	0.5843 134	0.0562 263	0.0962 263
¾	....	....	....	....	....	....	0.5785 271	0.0549 055	0.0949 055
14	0.5774 751	0.0546 690	0.0946 690	0.5743 745	0.0539 793	0.0939 793	0.5728 001	0.0536 330	0.0936 330
¼	....	....	....	....	....	....	0.5671 288	0.0524 062	0.0924 062
½	....	....	....	0.5631 123	0.0515 567	0.0915 567	0.5615 136	0.0512 229	0.0912 229
¾	....	....	....	....	....	....	0.5559 541	0.0500 808	0.0900 808
15	0.5552 645	0.0499 411	0.0899 411	0.5520 709	0.0492 998	0.0892 998	0.5504 496	0.0489 778	0.0889 778
¼	....	....	....	....	....	....	0.5449 996	0.0479 120	0.0879 120
½	....	....	....	0.5412 460	0.0471 927	0.0871 927	0.5396 036	0.0468 817	0.0868 817
¾	....	....	....	....	....	....	0.5342 692	0.0158 850	0.0858 850
16	0.5339 082	0.0458 200	0.0858 200	0.5306 333	0.0452 212	0.0852 212	0.5289 713	0.0449 205	0.0849 205
17	0.5133 733	0.0421 985	0.0821 985	0.5100 282	0.0416 373	0.0816 373	0.5083 310	0.0413 555	0.0813 555
18	0.4936 281	0.0389 933	0.0789 933	0.4902 232	0.0384 657	0.0784 657	0.4884 961	0.0382 008	0.0782 008
19	0.4746 424	0.0361 386	0.0761 386	0.4711 872	0.0356 411	0.0756 411	0.4694 351	0.0353 913	0.0753 913
20	0.4563 870	0.0335 818	0.0735 818	0.4528 904	0.0331 115	0.0731 115	0.4511 179	0.0328 754	0.0728 754
21	0.4388 336	0.0312 801	0.0712 801	0.4353 041	0.0308 346	0.0708 346	0.4335 155	0.0306 109	0.0706 109
22	0.4219 554	0.0291 988	0.0691 988	0.4184 007	0.0287 759	0.0687 759	0.4165 998	0.0285 636	0.0685 636
23	0.4057 264	0.0273 090	0.0673 090	0.4021 537	0.0269 068	0.0669 068	0.4003 442	0.0267 049	0.0667 049
24	0.3901 215	0.0255 868	0.0655 868	0.3865 376	0.0252 037	0.0652 037	0.3847 229	0.0250 114	0.0650 114
25	0.3751 168	0.0240 120	0.0640 120	0.3715 279	0.0236 464	0.0636 464	0.3697 112	0.0234 630	0.0634 630

RATE of INTEREST: 4 *per Cent. per Ann.*——CORRESPONDING VALUE of

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.04.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02.			RATIO *of* INTEREST: *QUARTERLY*, 0.01.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	2.7724 698	44.311 745	15.982 77	2.8003 282	45.008 205	16.072 47	2.8146 401	45.366 003	16.117 87
27	2.8833 686	47.084 214	16.329 59	2.9134 614	47.836 536	16.419 14	2.9289 258	48.223 145	16.464 45
28	2.9987 033	49.967 583	16.663 06	3.0311 653	50.779 132	16.752 35	3.0478 519	51.196 298	16.797 50
29	3.1186 515	52.966 286	16.983 71	3.1536 244	53.840 609	17.072 61	3.1716 069	54.290 173	17.117 56
30	3.2433 975	56.084 938	17.292 03	3.2810 308	57.025 770	17.380 44	3.3003 869	57.509 672	17.425 13
31	3.3731 334	59.328 335	17.588 49	3.4135 844	60.339 611	17.676 32	3.4343 958	60.859 896	17.720 70
32	3.5080 587	62.701 469	17.873 55	3.5514 932	63.787 331	17.960 71	3.5738 461	64.346 152	18.004 74
33	3.6483 811	66.209 527	18.147 65	3.6949 736	67.374 339	18.234 05	3.7189 586	67.973 964	18.277 69
34	3.7943 163	69.857 909	18.411 20	3.8442 505	71.106 263	18.496 78	3.8699 632	71.749 080	18.539 99
35	3.9460 890	73.652 225	18.664 61	3.9995 582	74.988 956	18.749 31	4.0270 992	75.677 480	18.792 06
36	4.1039 326	77.598 314	18.908 28	4.1611 404	79.028 509	18.992 03	4.1906 156	79.765 390	19.034 29
37	4.2680 899	81.702 246	19.142 58	4.3292 504	83.231 261	19.225 33	4.3607 714	84.019 285	19.267 07
38	4.4388 135	85.970 336	19.367 86	4.5041 522	87.603 804	19.449 57	4.5378 362	88.445 905	19.490 77
39	4.6163 660	90.409 150	19.584 48	4.6861 199	92.152 998	19.665 10	4.7220 905	93.052 264	19.705 73
40	4.8010 206	95.025 516	19.792 77	4.8754 392	96.885 979	19.872 26	4.9138 264	97.845 659	19.912 31
41	4.9930 615	99.826 536	19.993 05	5.0724 069	101.81 017	20.071 37	5.1133 474	102.83 369	20.110 83
42	5.1927 839	104.81 960	20.185 63	5.2773 321	106.93 330	20.262 76	5.3209 698	108.02 425	20.301 61
43	5.4004 953	110.01 238	20.370 79	5.4905 364	112.26 341	20.446 71	5.5370 225	113.42 556	20.484 94
44	5.6165 151	115.41 288	20.548 84	5.7123 540	117.80 885	20.623 52	5.7618 478	119.04 620	20.661 12
45	5.8411 757	121.02 939	20.720 04	5.9431 331	123.57 833	20.793 46	5.9958 020	124.89 505	20.830 40
46	6.0748 227	126.87 057	20.884 65	6.1832 357	129.58 089	20.956 81	6.2392 556	130.98 139	20.993 11
47	6.3178 156	132.94 539	21.042 94	6.4330 384	135.82 596	21.113 81	6.4925 944	137.31 466	21.149 46
48	6.5705 282	139.26 321	21.195 13	6.6929 332	142.32 333	21.264 72	6.7562 197	143.90 549	21.299 70
49	6.8333 494	145.83 373	21.341 47	6.9633 277	149.08 319	21.409 77	7.0305 494	150.76 373	21.444 09
50	7.1066 833	152.66 708	21.482 18	7.2446 461	156.11 615	21.549 18	7.3160 178	157.90 045	21.562 84
51	7.3909 507	159.77 377	21.617 49	7.5373 298	163.43 325	21.683 18	7.6130 775	165.32 694	21.716 18
52	7.6865 887	167.16 472	21.747 58	7.8418 379	171.04 595	21.811 97	7.9221 990	173.05 497	21.844 31
53	7.9940 523	174.85 131	21.872 67	8.1586 484	178.96 621	21.935 77	8.2438 720	181.09 680	21.967 44
54	8.3138 143	182.84 536	21.992 96	8.4882 578	187.20 644	22.054 75	8.5786 063	189.46 516	22.085 77
55	8.6463 669	191.15 917	22.108 61	8.8311 834	195.77 959	22.169 12	8.9269 321	198.17 330	22.199 49
56	8.9922 216	199.80 554	22.219 82	9.1879 632	204.69 908	22.279 05	9.2894 014	207.23 503	22.308 77
57	9.3519 105	208.79 776	22.326 75	9.5591 569	213.97 892	22.384 71	9.6665 883	216.66 471	22.413 77
58	9.7259 869	218.14 967	22.429 57	9.9453 469	223.63 367	22.486 26	10.059 091	226.47 726	22.514 69
59	10.115 026	227.87 566	22.528 43	10.347 139	233.67 847	22.583 87	10.467 530	236.68 825	22.611 66
60	10.519 627	237.99 069	22.623 49	10.765 163	244.12 908	22.677 70	10.892 554	247.31 384	22.704 85
61	10.940 413	248.51 031	22.714 89	11.200 076	255.00 190	22.767 87	11.334 835	258.37 088	22.794 41
62	11.378 029	259.45 073	22.802 78	11.652 559	266.31 397	22.854 55	11.795 075	269.87 687	22.880 47
63	11.833 150	270.82 875	22.887 29	12.123 322	278.08 306	22.937 86	12.274 002	281.85 005	22.963 17
64	12.306 476	282.66 190	22.968 55	12.613 105	290.32 762	23.017 94	12.772 376	294.30 939	23.042 65
65	12.798 735	294.96 838	23.046 68	13.122 674	303.06 685	23.094 90	13.290 985	307.27 464	23.119 03
66	13.310 685	307.76 712	23.121 81	13.652 830	316.32 075	23.168 88	13.830 653	320.76 632	23.192 48
67	13.843 112	321.07 780	23.194 05	14.204 404	330.11 011	23.239 98	14.392 233	334.80 582	23.262 95
68	14.396 836	334.92 091	23.263 51	14.778 262	344.45 656	23.308 32	14.976 615	349.41 538	23.330 73
69	14.972 710	349.31 775	23.330 30	15.375 304	359.38 260	23.374 02	15.584 726	364.61 814	23.395 87
70	15.571 618	364.29 046	23.394 51	15.996 466	374.91 166	23.437 15	16.217 528	380.43 820	23.458 46
71	16.194 483	379.86 208	23.456 26	16.642 724	391.06 809	23.497 84	16.876 025	396.90 062	23.518 61
72	16.842 262	396.05 656	23.515 64	17.315 090	407.87 724	23.556 17	17.561 259	414.03 148	23.576 41
73	17.515 953	412.89 882	23.572 73	18.014 619	425.36 548	23.612 24	18.274 317	431.85 791	23.631 96
74	18.216 591	430.41 478	23.627 62	18.742 410	443.56 025	23.666 13	19.016 327	450.40 818	23.685 34
75	18.945 255	448.63 137	23.680 41	19.499 603	462.49 008	23.717 92	19.788 466	469.71 166	23.736 64
76	19.703 065	467.57 662	23.731 16	20.287 387	482.18 468	23.767 71	20.591 957	489.79 893	23.785 93
77	20.491 187	487.27 969	23.779 96	21.106 998	502.67 494	23.815 56	21.428 073	510.70 183	23.833 31
78	21.310 835	507.77 087	23.826 89	21.959 720	523.99 301	23.861 56	22.298 139	532.45 348	23.878 83
79	22.163 268	529.08 171	23.872 01	22.846 893	546.17 233	23.905 76	23.203 533	555.08 832	23.922 58
80	23.049 799	551.24 498	23.915 39	23.769 908	569.24 769	23.948 25	24.145 689	578.64 224	23.964 62
81	23.971 791	574.29 478	23.957 11	24.730 212	593.25 530	23.989 09	25.126 101	603.15 253	24.005 02
82	24.930 663	598.26 657	23.997 22	25.729 312	618.23 281	24.028 35	26.146 322	628.65 804	24.043 84
83	25.927 889	623.19 723	24.035 79	26.768 777	644.21 941	24.066 08	27.207 967	655.19 918	24.081 15
84	26.965 005	649.12 512	24.072 87	27.850 235	671.25 588	24.102 34	28.312 720	682.81 799	24.117 00
85	28.043 605	676.09 012	24.108 53	28.975 385	699.38 462	24.137 20	29.462 330	711.55 824	24.151 46
86	29.165 349	704.13 373	24.142 82	30.145 990	728.64 976	24.170 70	30.658 618	741.46 546	24.184 57
87	30.331 963	733.29 908	24.175 79	31.363 888	759.09 721	24.202 91	31.903 481	772.58 703	24.216 39
88	31.545 242	763.63 104	24.207 49	32.630 989	790.77 473	24.233 86	33.198 891	804.97 227	24.246 96
89	32.807 051	795.17 628	24.237 97	33.949 281	823.73 203	24.263 61	34.546 899	838.67 247	24.276 35
90	34.119 333	827.98 333	24.267 28	35.320 832	858.02 081	24.292 20	35.949 641	873.74 103	24.304 58
91	35.484 107	862.10 267	24.295 46	36.747 794	893.69 485	24.319 68	37.409 341	910.23 352	24.331 72
92	36.903 471	897.58 677	24.322 56	38.232 405	930.81 012	24.346 10	38.928 310	948.20 775	24.357 79
93	38.379 610	934.49 024	24.348 61	39.776 994	969.42 485	24.371 50	40.508 956	987.72 389	24.382 85
94	39.914 794	972.86 985	24.373 67	41.383 984	1009.5 996	24.395 90	42.153 782	1028.8 415	24.406 93
95	41.511 386	1012.7 846	24.397 76	43.055 897	1051.3 974	24.419 36	43.865 394	1071.6 349	24.430 08
96	43.171 841	1054.2 960	24.420 92	44.795 356	1094.8 839	24.441 91	45.646 505	1116.1 626	24.452 31
97	44.898 715	1097.4 679	24.443 19	46.605 088	1140.1 272	24.463 58	47.499 936	1162.4 984	24.473 68
98	46.694 664	1142.3 666	24.464 61	48.487 934	1187.1 983	24.484 41	49.428 624	1210.7 156	24.494 22
99	48.562 450	1189.0 613	24.485 20	50.446 846	1236.1 712	24.504 43	51.435 625	1260.8 906	24.513 95
100	50.504 948	1237.6 237	24.505 00	52.484 899	1287.1 225	24.523 67	53.524 117	1313.1 029	24.532 92
	Value of Perpetual Ann.		25.000 00	- - - - - - - - - -		25.000 00	- - - - - - - - - -		25.000 00

PERPETUAL STOCK: 3 *p.C.* 75; 3½ *p.C.* 87,5; 4 *p.C.* 100; 5 *p.C.* 125.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.04.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02.			RATIO *of* INTEREST: *QUARTERLY*, 0.01.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.3606 892	0.0225 674	0.0625 674	0.3571 010	0.0222 182	0.0622 182	0.3552 852	0.0220 429	0.0620 429
27	0.3468 166	0.0212 385	0.0612 385	0.3432 343	0.0209 045	0.0609 045	0.3414 221	0.0207 369	0.0607 369
28	0.3334 775	0.0200 130	0.0600 130	0.3299 061	0.0196 931	0.0596 931	0.3280 999	0.0195 326	0.0595 326
29	0.3206 514	0.0188 799	0.0588 799	0.3170 955	0.0185 733	0.0585 733	0.3152 976	0.0184 195	0.0584 195
30	0.3083 187	0.0178 301	0.0578 301	0.3047 823	0.0175 359	0.0575 359	0.3029 948	0.0173 884	0.0573 884
31	0.2964 602	0.0168 554	0.0568 554	0.2929 472	0.0165 729	0.0565 729	0.2911 720	0.0164 312	0.0564 312
32	0.2850 579	0.0159 486	0.0559 486	0.2815 717	0.0156 771	0.0556 771	0.2798 106	0.0155 409	0.0555 409
33	0.2740 942	0.0151 036	0.0551 036	0.2706 379	0.0148 424	0.0548 424	0.2688 925	0.0147 115	0.0547 115
34	0.2635 521	0.0143 148	0.0543 148	0.2601 287	0.0140 635	0.0540 635	0.2584 004	0.0139 375	0.0539 375
35	0.2534 154	0.0135 773	0.0535 773	0.2500 276	0.0133 353	0.0533 353	0.2483 177	0.0132 140	0.0532 140
36	0.2436 687	0.0128 869	0.0528 869	0.2403 187	0.0126 537	0.0526 537	0.2386 284	0.0125 368	0.0525 368
37	0.2342 968	0.0122 396	0.0522 396	0.2309 869	0.0120 147	0.0520 147	0.2293 172	0.0119 020	0.0519 020
38	0.2252 854	0.0116 319	0.0516 319	0.2220 174	0.0114 150	0.0514 150	0.2203 693	0.0113 063	0.0513 063
39	0.2166 206	0.0110 608	0.0510 608	0.2133 962	0.0108 515	0.0508 515	0.2117 706	0.0107 466	0.0507 466
40	0.2082 890	0.0105 235	0.0505 235	0.2051 097	0.0103 214	0.0503 214	0.2035 074	0.0102 202	0.0502 202
41	0.2002 779	0.0100 174	0.0500 174	0.1971 450	0.0098 222	0.0498 222	0.1955 666	0.0097 244	0.0497 244
42	0.1925 749	0.0095 402	0.0495 402	0.1894 897	0.0093 516	0.0493 516	0.1879 357	0.0092 572	0.0492 572
43	0.1851 682	0.0090 899	0.0490 899	0.1821 316	0.0089 076	0.0489 076	0.1806 025	0.0088 164	0.0488 164
44	0.1780 464	0.0086 645	0.0486 645	0.1750 592	0.0084 883	0.0484 883	0.1735 555	0.0084 001	0.0484 001
45	0.1711 984	0.0082 625	0.0482 625	0.1682 614	0.0080 920	0.0480 920	0.1667 834	0.0080 067	0.0480 067
46	0.1646 139	0.0078 820	0.0478 820	0.1617 276	0.0077 172	0.0477 172	0.1602 755	0.0076 347	0.0476 347
47	0.1582 826	0.0075 219	0.0475 219	0.1554 476	0.0073 624	0.0473 624	0.1540 216	0.0072 825	0.0472 825
48	0.1521 948	0.0071 806	0.0471 806	0.1494 113	0.0070 263	0.0470 263	0.1480 118	0.0069 490	0.0469 490
49	0.1463 411	0.0068 571	0.0468 571	0.1436 094	0.0067 077	0.0467 077	0.1422 364	0.0066 329	0.0466 329
50	0.1407 126	0.0065 502	0.0465 502	0.1380 330	0.0064 055	0.0464 055	0.1366 864	0.0063 331	0.0463 331
51	0.1353 006	0.0062 588	0.0462 588	0.1326 730	0.0061 187	0.0461 187	0.1313 529	0.0060 486	0.0460 486
52	0.1300 967	0.0059 821	0.0459 821	0.1275 211	0.0058 464	0.0458 464	0.1262 276	0.0057 785	0.0457 785
53	0.1250 930	0.0057 191	0.0457 191	0.1225 693	0.0055 876	0.0455 876	0.1213 022	0.0055 219	0.0455 219
54	0.1202 817	0.0054 691	0.0454 691	0.1178 098	0.0053 417	0.0453 417	0.1165 690	0.0052 780	0.0452 780
55	0.1156 555	0.0052 312	0.0452 312	0.1132 351	0.0051 078	0.0451 078	0.1120 206	0.0050 461	0.0450 461
56	0.1112 072	0.0050 049	0.0450 049	0.1088 381	0.0048 852	0.0448 852	0.1076 496	0.0048 254	0.0448 254
57	0.1069 300	0.0047 893	0.0447 893	0.1046 117	0.0046 734	0.0446 734	0.1034 491	0.0046 154	0.0446 154
58	0.1028 173	0.0045 841	0.0445 841	0.1005 495	0.0044 716	0.0444 716	0.0994 126	0.0044 155	0.0444 155
59	0.0988 628	0.0043 884	0.0443 884	0.0966 451	0.0042 794	0.0442 794	0.0955 335	0.0042 250	0.0442 250
60	0.0950 604	0.0042 018	0.0442 018	0.0928 922	0.0040 962	0.0440 962	0.0918 058	0.0040 434	0.0440 434
61	0.0914 042	0.0040 240	0.0440 240	0.0892 851	0.0039 215	0.0439 215	0.0882 236	0.0038 704	0.0438 704
62	0.0878 887	0.0038 543	0.0438 543	0.0858 181	0.0037 550	0.0437 550	0.0847 812	0.0037 054	0.0437 054
63	0.0845 084	0.0036 924	0.0436 924	0.0824 856	0.0035 960	0.0435 960	0.0814 730	0.0035 480	0.0435 480
64	0.0812 580	0.0035 378	0.0435 378	0.0792 826	0.0034 444	0.0434 444	0.0782 940	0.0033 978	0.0433 978
65	0.0781 327	0.0033 902	0.0433 902	0.0762 040	0.0032 996	0.0432 996	0.0752 390	0.0032 544	0.0432 544
66	0.0751 276	0.0032 492	0.0432 492	0.0732 449	0.0031 613	0.0431 613	0.0723 032	0.0031 175	0.0431 175
67	0.0722 381	0.0031 145	0.0431 145	0.0704 007	0.0030 293	0.0430 293	0.0694 819	0.0029 868	0.0429 868
68	0.0694 597	0.0029 858	0.0429 858	0.0676 670	0.0029 031	0.0429 031	0.0667 708	0.0028 619	0.0428 619
69	0.0667 882	0.0028 627	0.0428 627	0.0650 394	0.0027 825	0.0427 825	0.0641 654	0.0027 426	0.0427 426
70	0.0642 194	0.0027 451	0.0427 451	0.0625 138	0.0026 673	0.0426 673	0.0616 617	0.0026 285	0.0426 285
71	0.0617 494	0.0026 325	0.0426 325	0.0600 863	0.0025 571	0.0425 571	0.0592 557	0.0025 195	0.0425 195
72	0.0593 744	0.0025 249	0.0425 249	0.0577 531	0.0024 517	0.0424 517	0.0569 435	0.0024 153	0.0424 153
73	0.0570 908	0.0024 219	0.0424 219	0.0555 105	0.0023 509	0.0423 509	0.0547 216	0.0023 156	0.0423 156
74	0.0548 950	0.0023 233	0.0423 233	0.0533 549	0.0022 545	0.0422 545	0.0525 864	0.0022 202	0.0422 202
75	0.0527 837	0.0022 290	0.0422 290	0.0512 831	0.0021 622	0.0421 622	0.0505 345	0.0021 290	0.0421 290
76	0.0507 535	0.0021 387	0.0421 387	0.0492 917	0.0020 739	0.0420 739	0.0485 626	0.0020 417	0.0420 417
77	0.0488 015	0.0020 522	0.0420 522	0.0473 777	0.0019 894	0.0419 894	0.0466 678	0.0019 581	0.0419 581
78	0.0469 245	0.0019 694	0.0419 694	0.0455 379	0.0019 084	0.0419 084	0.0448 468	0.0018 781	0.0418 781
79	0.0451 197	0.0018 901	0.0418 901	0.0437 696	0.0018 309	0.0418 309	0.0430 969	0.0018 015	0.0418 015
80	0.0433 843	0.0018 142	0.0418 142	0.0420 700	0.0017 567	0.0417 567	0.0414 153	0.0017 282	0.0417 282
81	0.0417 157	0.0017 413	0.0417 413	0.0404 364	0.0016 856	0.0416 856	0.0397 992	0.0016 580	0.0416 580
82	0.0401 112	0.0016 715	0.0416 715	0.0388 662	0.0016 175	0.0416 175	0.0382 463	0.0015 907	0.0415 907
83	0.0385 685	0.0016 046	0.0416 046	0.0373 570	0.0015 523	0.0415 523	0.0367 539	0.0015 263	0.0415 263
84	0.0370 851	0.0015 405	0.0415 405	0.0359 063	0.0014 897	0.0414 897	0.0353 198	0.0014 645	0.0414 645
85	0.0356 588	0.0014 791	0.0414 791	0.0345 121	0.0014 298	0.0414 298	0.0339 416	0.0014 054	0.0414 054
86	0.0342 873	0.0014 202	0.0414 202	0.0331 719	0.0013 724	0.0413 724	0.0326 173	0.0013 487	0.0413 487
87	0.0329 685	0.0013 637	0.0413 637	0.0318 838	0.0013 174	0.0413 174	0.0313 445	0.0012 944	0.0412 944
88	0.0317 005	0.0013 095	0.0413 095	0.0306 457	0.0012 646	0.0412 646	0.0301 215	0.0012 423	0.0412 423
89	0.0304 813	0.0012 576	0.0412 576	0.0294 557	0.0012 140	0.0412 140	0.0289 462	0.0011 924	0.0411 924
90	0.0293 089	0.0012 078	0.0412 078	0.0283 119	0.0011 655	0.0411 655	0.0278 167	0.0011 445	0.0411 445
91	0.0281 816	0.0011 600	0.0411 600	0.0272 125	0.0011 190	0.0411 190	0.0267 313	0.0010 986	0.0410 986
92	0.0270 977	0.0011 141	0.0411 141	0.0261 558	0.0010 743	0.0410 743	0.0256 882	0.0010 546	0.0410 546
93	0.0260 555	0.0010 701	0.0410 701	0.0251 402	0.0010 315	0.0410 315	0.0246 859	0.0010 124	0.0410 124
94	0.0250 534	0.0010 279	0.0410 279	0.0241 639	0.0009 905	0.0409 905	0.0237 227	0.0009 720	0.0409 720
95	0.0240 898	0.0009 874	0.0409 874	0.0232 256	0.0009 511	0.0409 511	0.0227 970	0.0009 332	0.0409 332
96	0.0231 632	0.0009 485	0.0409 485	0.0223 237	0.0009 133	0.0409 133	0.0219 075	0.0008 959	0.0408 959
97	0.0222 723	0.0009 112	0.0409 112	0.0214 569	0.0008 771	0.0408 771	0.0210 527	0.0008 602	0.0408 602
98	0.0214 157	0.0008 754	0.0408 754	0.0206 237	0.0008 423	0.0408 423	0.0202 312	0.0008 260	0.0408 260
99	0.0205 920	0.0008 410	0.0408 410	0.0198 228	0.0008 089	0.0408 089	0.0194 418	0.0007 931	0.0407 931
100	0.0198 000	0.0008 080	0.0408 080	0.0190 531	0.0007 769	0.0407 769	0.0186 832	0.0007 616	0.0407 616
	Ratio of Perpetual Ann.		0.0400 000			0.0400 000			0.0400 000

RATE OF INTEREST: 4¼ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0425.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02125.			RATIO *of* INTEREST: *QUARTERLY*, 0.010625.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
0¼	....	....	....	....	....	....	1.0106 250	0.2500 000	0.2473 72
½	....	....	....	1.0212 500	0.5000 000	0.4895 96	1.0213 629	0.5026 563	0.4921 43
¾	....	....	....	....	....	....	1.0322 149	0.7579 970	0.7343 40
1	1.0425 000	1.0000 000	0.9592 33	1.0429 516	1.0106 250	0.9690 05	1.0431 882	1.0160 507	0.9729 92
¼	....	....	....	....	....	....	1.0542 660	1.2768 462	1.2111 23
½	....	....	....	1.0651 143	1.5321 008	1.4384 38	1.0654 675	1.5404 127	1.4457 62
¾	....	....	....	....	....	....	1.0767 881	1.8067 796	1.6779 34
2	1.0868 063	2.0425 000	1.8793 60	1.0877 480	2.0646 579	1.8981 03	1.0882 290	2.0759 766	1.9076 65
¼	....	....	....	....	....	....	1.0997 914	2.3480 339	2.1349 81
½	....	....	....	1.1108 626	2.6085 319	2.3482 04	1.1114 767	2.6229 818	2.3599 07
¾	....	....	....	....	....	....	1.1232 862	2.9008 509	2.5824 68
3	1.1329 955	3.1293 063	2.7619 76	1.1344 684	3.1639 632	2.7889 39	1.1352 211	3.1816 725	2.8026 90
¼	....	....	....	....	....	....	1.1472 828	3.4654 777	3.0205 96
½	....	....	....	1.1585 759	3.7311 374	3.2205 03	1.1594 727	3.7522 984	3.2352 11
¾	....	....	....	....	....	....	1.1717 921	4.0421 666	3.4495 60
4	1.1811 478	4.2623 018	3.6086 10	1.1831 956	4.3104 854	3.6430 88	1.1842 424	4.3351 146	3.6606 65
¼	....	....	....	....	....	....	1.1968 249	4.6311 752	3.8695 51
½	....	....	....	1.2083 385	4.9020 832	4.0568 79	1.2095 412	4.9303 815	4.0762 41
¾	....	....	....	....	....	....	1.2223 926	5.2327 668	4.2807 58
5	1.2313 466	5.4434 496	4.4207 29	1.2340 157	5.5062 525	4.4620 60	1.2353 805	5.5383 649	4.4831 25
¼	....	....	....	....	....	....	1.2485 064	5.8472 100	4.6833 64
½	....	....	....	1.2602 386	6.1232 603	4.8568 10	1.2617 718	6.1593 366	4.8814 98
¾	....	....	....	....	....	....	1.2751 781	6.4747 796	5.0775 49
6	1.2836 788	6.6747 962	5.1997 40	1.2870 186	6.7533 796	5.2473 05	1.2887 269	6.7985 741	5.2715 39
¼	....	....	....	....	....	....	1.3024 196	7.1157 559	5.4634 90
½	....	....	....	1.3143 678	7.3968 889	5.6277 16	1.3162 578	7.4413 608	5.6534 22
¾	....	....	....	....	....	....	1.3302 431	7.7704 252	5.8413 58
7	1.3382 352	7.9584 750	5.9469 93	1.3422 981	8.0640 728	6.0002 12	1.3443 769	8.1029 860	6.0273 17
¼	....	....	....	....	....	....	1.3586 609	8.4390 802	6.2113 22
½	....	....	....	1.3708 219	8.7252 219	6.3649 56	1.3730 967	8.7787 454	6.3933 92
¾	....	....	....	....	....	....	1.3876 858	9.1220 196	6.5735 48
8	1.3951 102	9.2967 102	6.6637 82	1.3999 519	9.4106 398	6.7221 12	1.4024 300	9.4689 411	6.7518 10
¼	....	....	....	....	....	....	1.4173 308	9.8195 486	6.9281 98
½	....	....	....	1.4297 009	10.110 609	7.0718 35	1.4323 900	10.173 881	7.1027 32
¾	....	....	....	....	....	....	1.4476 091	10.531 979	7.2754 30
9	1.4544 024	10.691 820	7.3513 50	1.4600 890	10.825 459	7.4142 82	1.4629 899	10.893 881	7.4463 13
¼	....	....	....	....	....	....	1.4785 342	11.259 629	7.6154 00
½	....	....	....	1.4911 088	11.555 500	7.7496 03	1.4942 436	11.629 262	7.7827 08
¾	....	....	....	....	....	....	1.5101 200	12.002 823	7.9482 58
10	1.5162 145	12.146 223	8.0108 87	1.5227 948	12.301 055	8.0779 46	1.5261 650	12.380 353	8.1120 07
¼	....	....	....	....	....	....	1.5423 805	12.761 894	8.2741 54
½	....	....	....	1.5551 542	13.062 452	8.3994 58	1.5587 683	13.147 489	8.4345 37
¾	....	....	....	....	....	....	1.5753 302	13.537 181	8.5932 34
11	1.5806 536	13.662 437	8.6435 37	1.5882 012	13.840 029	8.7142 79	1.5920 681	13.931 014	8.7502 63
¼	....	....	....	....	....	....	1.6089 838	14.329 031	8.9056 40
½	....	....	....	1.6219 505	14.634 130	9.0225 50	1.6260 793	14.731 277	9.0593 84
¾	....	....	....	....	....	....	1.6433 564	15.137 797	9.2115 12
12	1.6478 314	15.243 091	9.2503 95	1.6564 170	15.445 105	9.3244 06	1.6608 170	15.548 636	9.3620 40
¼	....	....	....	....	....	....	1.6784 632	15.963 840	9.5109 86
½	....	....	....	1.6916 158	16.273 313	9.6199 82	1.6962 969	16.383 456	9.6583 66
¾	....	....	....	....	....	....	1.7143 200	16.807 530	9.8041 97
13	1.7178 642	16.890 922	9.8325 13	1.7275 627	17.119 121	9.9094 07	1.7325 347	17.236 110	9.9484 94
¼	....	....	....	....	....	....	1.7509 429	17.669 244	10.091 27
½	....	....	....	1.7642 734	17.982 903	10.192 81	1.7695 466	18.106 980	10.232 55
¾	....	....	....	....	....	....	1.7883 481	18.549 366	10.372 35
14	1.7908 734	18.608 786	10.390 90	1.8017 642	18.865 039	10.470 32	1.8073 493	18.996 453	10.510 07
¼	....	....	....	....	....	....	1.8265 523	19.448 291	10.647 54
½	....	....	....	1.8400 517	19.766 921	10.742 05	1.8459 595	19.904 929	10.782 97
¾	....	....	....	....	....	....	1.8655 728	20.366 418	10.916 98
15	1.8669 855	20.399 660	10.926 52	1.8791 528	20.685 947	11.008 12	1.8853 945	20.832 812	11.049 58
¼	....	....	....	....	....	....	1.9054 268	21.304 160	11.180 78
½	....	....	....	1.9190 848	21.625 524	11.268 07	1.9256 720	21.780 517	11.310 61
¾	....	....	....	....	....	....	1.9461 322	22.261 935	11.439 07
16	1.9463 324	22.266 645	11.440 31	1.9598 653	22.585 066	11.523 78	1.9668 099	22.748 468	11.566 18
17	2.0290 516	24.212 978	11.933 15	2.0440 446	24.565 755	12.018 21	2.0517 410	24.746 847	12.061 39
18	2.1152 862	26.242 029	12.405 90	2.1318 395	26.631 517	12.492 27	2.1403 396	26.831 519	12.536 10
19	2.2051 859	28.357 316	12.859 38	2.2234 053	28.786 008	12.946 81	2.2327 641	29.006 213	12.991 17
20	2.2989 063	30.562 501	13.294 37	2.3189 041	31.033 037	13.382 63	2.3291 796	31.274 814	13.427 40
21	2.3966 098	32.861 408	13.711 62	2.4185 046	33.376 579	13.800 50	2.4297 586	33.641 379	13.845 56
22	2.4984 657	35.258 018	14.111 87	2.5223 832	35.820 780	14.201 17	2.5346 808	36.110 137	14.246 42
23	2.6046 505	37.756 483	14.495 80	2.6307 235	38.369 964	14.585 33	2.6441 338	38.685 501	14.630 69
24	2.7153 482	40.361 134	14.864 08	2.7437 172	41.028 639	14.953 67	2.7583 132	41.372 075	14.999 05
25	2.8307 505	43.076 482	15.217 34	2.8615 641	43.801 508	15.306 84	2.8774 281	44.174 661	15.352 16

PERPETUAL STOCK: 3 *p.C.* 70,5882; 3½ *p.C.* 82,3529; 4 *p.C.* 94,1176; 5 *p.C.* 117,6471.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0425.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02125.			RATIO *of* INTEREST: *QUARTERLY*, 0.010625.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
0¼	····	····	····	····	····	····	0.9894 867	4.0000 000	4.0425 000
½	····	····	····	0.9791 921	2.0000 000	2.0425 000	0.0790 840	1.9894 933	2.0319 933
¾	····	····	····	····	····	····	0.9687 906	1.3192 665	1.3617 665
1	0.9592 326	1.0000 000	1.0425 000	0.9588 173	0.9894 867	1.0319 867	0.9586 053	0.9842 028	1.0267 028
¼	····	····	····	····	····	····	0.9485 273	0.7831 797	0.8256 797
½	····	····	····	0.9388 664	0.6526 985	0.6951 985	0.9385 551	0.6491 767	0.6916 767
¾	····	····	····	····	····	····	0.9286 878	0.5534 710	0.5959 710
2	0.9201 272	0.4895 961	0.5320 961	0.9193 306	0.4843 417	0.5268 417	0.9189 242	0.4817 010	0.5242 010
¼	····	····	····	····	····	····	0.9092 637	0.4258 883	0.4683 883
½	····	····	····	0.9002 013	0.3833 574	0.4258 574	0.8997 040	0.3812 455	0.4237 455
¾	····	····	····	····	····	····	0.8902 451	0.3447 264	0.3872 264
3	0.8826 161	0.3195 597	0.3620 597	0.8814 701	0.3160 593	0.3585 593	0.8808 857	0.3143 001	0.3568 001
¼	····	····	····	····	····	····	0.8716 247	0.2885 605	0.3310 605
½	····	····	····	0.8631 286	0.2680 105	0.3105 105	0.8624 610	0.2665 043	0.3090 043
¾	····	····	····	····	····	····	0.8533 938	0.2473 921	0.2898 921
4	0.8466 341	0.2346 150	0.2771 150	0.8451 688	0.2319 924	0.2744 924	0.8444 217	0.2306 744	0.2731 744
¼	····	····	····	····	····	····	0.8355 441	0.2159 279	0.2584 279
½	····	····	····	0.8275 827	0.2039 949	0.2464 949	0.8267 597	0.2028 240	0.2453 240
¾	····	····	····	····	····	····	0.8180 678	0.1911 035	0.2336 035
5	0.8121 190	0.1837 070	0.2262 070	0.8103 624	0.1816 117	0.2241 117	0.8094 672	0.1805 587	0.2230 587
¼	····	····	····	····	····	····	0.8009 570	0.1710 217	0.2135 217
½	····	····	····	0.7935 005	0.1633 117	0.2058 117	0.7925 363	0.1623 552	0.2048 552
¾	····	····	····	····	····	····	0.7842 042	0.1544 454	0.1969 454
6	0.7790 111	0.1498 173	0.1923 173	0.7769 895	0.1480 740	0.1905 740	0.7759 596	0.1471 983	0.1896 983
¼	····	····	····	····	····	····	0.7678 017	0.1405 332	0.1830 332
½	····	····	····	0.7608 221	0.1351 920	0.1776 920	0.7597 296	0.1343 840	0.1768 840
¾	····	····	····	····	····	····	0.7517 423	0.1286 931	0.1711 931
7	0.7472 528	0.1256 522	0.1681 522	0.7449 910	0.1241 608	0.1666 608	0.7438 390	0.1234 113	0.1659 113
¼	····	····	····	····	····	····	0.7360 188	0.1184 963	0.1609 963
½	····	····	····	0.7294 894	0.1146 103	0.1571 103	0.7282 808	0.1139 115	0.1564 115
¾	····	····	····	····	····	····	0.7206 242	0.1096 248	0.1521 248
8	0.7167 893	0.1075 649	0.1500 649	0.7143 104	0.1062 628	0.1487 628	0.7130 481	0.1056 084	0.1481 084
¼	····	····	····	····	····	····	0.7055 515	0.1018 377	0.1443 377
½	····	····	····	0.6994 470	0.0989 060	0.1414 060	0.6981 339	0.0982 909	0.1407 909
¾	····	····	····	····	····	····	0.6907 942	0.0949 489	0.1374 489
9	0.6875 076	0.0935 294	0.1360 294	0.6848 930	0.0923 748	0.1348 748	0.6835 317	0.0917 947	0.1342 947
¼	····	····	····	····	····	····	0.6763 456	0.0888 129	0.1313 129
½	····	····	····	0.6706 419	0.0865 389	0.1290 389	0.6692 349	0.0859 900	0.1284 900
¾	····	····	····	····	····	····	0.6621 991	0.0833 137	0.1258 137
10	0.6595 373	0.0823 301	0.1248 301	0.6566 873	0.0812 938	0.1237 938	0.6552 372	0.0807 732	0.1232 732
¼	····	····	····	····	····	····	0.6483 485	0.0783 583	0.1208 583
½	····	····	····	0.6430 231	0.0765 553	0.1190 553	0.6415 322	0.0760 601	0.1185 601
¾	····	····	····	····	····	····	0.6347 876	0.0738 706	0.1163 706
11	0.6326 497	0.0731 934	0.1156 934	0.6296 431	0.0722 542	0.1147 542	0.6281 139	0.0717 823	0.1142 823
¼	····	····	····	····	····	····	0.6215 103	0.0697 884	0.1122 884
½	····	····	····	0.6165 416	0.0683 334	0.1108 334	0.6149 762	0.0678 828	0.1103 828
¾	····	····	····	····	····	····	0.6085 108	0.0660 598	0.1085 598
12	0.6068 588	0.0656 035	0.1081 035	0.6037 127	0.0647 455	0.1072 455	0.6021 133	0.0643 143	0.1068 143
¼	····	····	····	····	····	····	0.5957 831	0.0626 416	0.1051 416
½	····	····	····	0.5911 508	0.0614 503	0.1039 503	0.5895 195	0.0610 372	0.1035 372
¾	····	····	····	····	····	····	0.5833 230	0.0594 971	0.1019 971
13	0.5821 188	0.0592 034	0.1017 034	0.5788 502	0.0584 142	0.1009 142	0.5771 890	0.0580 177	0.1005 177
¼	····	····	····	····	····	····	0.5711 208	0.0565 955	0.0990 955
½	····	····	····	0.5668 056	0.0556 084	0.0981 084	0.5651 165	0.0552 273	0.0977 273
¾	····	····	····	····	····	····	0.5591 753	0.0539 102	0.0964 102
14	0.5583 868	0.0537 381	0.0962 381	0.5550 116	0.0530 081	0.0955 081	0.5532 966	0.0526 414	0.0951 414
¼	····	····	····	····	····	····	0.5474 795	0.0514 184	0.0939 184
½	····	····	····	0.5434 630	0.0505 921	0.0930 921	0.5417 237	0.0502 388	0.0927 388
¾	····	····	····	····	····	····	0.5360 284	0.0491 004	0.0916 004
15	0.5356 228	0.0490 204	0.0915 204	0.5321 547	0.0483 420	0.0908 420	0.5303 930	0.0480 012	0.0905 012
¼	····	····	····	····	····	····	0.5248 168	0.0469 392	0.0894 392
½	····	····	····	0.5210 817	0.0462 417	0.0887 417	0.5192 992	0.0459 126	0.0884 126
¾	····	····	····	····	····	····	0.5138 397	0.0449 197	0.0874 197
16	0.5137 869	0.0449 104	0.0874 104	0.5102 392	0.0442 770	0.0867 770	0.5084 375	0.0439 590	0.0864 590
17	0.4928 411	0.0413 002	0.0838 002	0.4892 261	0.0407 071	0.0832 071	0.4873 910	0.0404 092	0.0829 092
18	0.4727 493	0.0381 068	0.0806 068	0.4690 785	0.0375 495	0.0800 495	0.4672 156	0.0372 696	0.0797 696
19	0.4534 765	0.0352 643	0.0777 643	0.4497 606	0.0347 391	0.0772 391	0.4478 753	0.0344 754	0.0769 754
20	0.4349 894	0.0327 198	0.0752 198	0.4312 388	0.0322 237	0.0747 237	0.4293 357	0.0319 746	0.0744 746
21	0.4172 561	0.0304 308	0.0729 308	0.4134 786	0.0299 611	0.0724 611	0.4115 685	0.0297 253	0.0722 253
22	0.4002 456	0.0283 623	0.0708 623	0.3964 505	0.0279 168	0.0704 168	0.3945 270	0.0276 931	0.0701 931
23	0.3839 287	0.0264 855	0.0689 855	0.3801 236	0.0260 621	0.0685 621	0.3781 957	0.0256 495	0.0681 495
24	0.3682 769	0.0247 763	0.0672 763	0.3644 691	0.0243 732	0.0668 732	0.3625 404	0.0241 709	0.0666 709
25	0.3532 632	0.0232 145	0.0657 145	0.3494 592	0.0228 303	0.0653 303	0.3475 332	0.0226 374	0.0651 374

RATE of INTEREST: 4¼ *per Cent. per Ann.*——CORRESPONDING VALUE of

Years.	RATIO *of* INTEREST: *ANNUALLY,* 0.0425.			RATIO *of* INTEREST: *HALF-YEARLY,* 0.02125.			RATIO *of* INTEREST: *QUARTERLY,* 0.010625.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	2.9510 574	45.907 233	15.556 20	2.9844 727	46.693 476	15.645 47	3.0016 764	47.098 269	15.690 65
27	3.0764 773	48.858 290	15.881 25	3.1126 605	49.709 659	15.970 16	3.1312 953	50.148 124	16.015 14
28	3.2072 276	51.934 767	16.193 04	3.2463 541	52.855 391	16.281 46	3.2665 114	53.329 679	16.396 19
29	3.3435 348	55.141 995	16.492 13	3.3857 901	56.136 238	16.579 95	3.4075 664	56.648 620	16.624 37
30	3.4856 350	58.485 530	16.779 02	3.5312 151	59.558 002	16.866 15	3.5547 124	60.110 880	16.910 20
31	3.6337 745	61.971 165	17.054 21	3.6828 863	63.126 737	17.140 56	3.7082 125	63.722 648	17.184 19
32	3.7882 099	65.604 939	17.318 19	3.8410 720	66.848 753	17.403 67	3.8683 412	67.490 380	17.446 85
33	3.9492 088	69.393 149	17.571 41	4.0060 581	70.730 637	17.655 94	4.0353 845	71.420 811	17.698 64
34	4.1170 502	73.342 358	17.814 30	4.1781 183	74.779 253	17.897 82	4.2096 411	75.520 966	17.940 00
35	4.2920 248	77.459 408	18.047 29	4.3575 750	79.001 764	18.129 75	4.3914 224	79.798 175	18.171 38
36	4.4744 359	81.751 433	18.270 78	4.5447 396	83.405 638	18.352 13	4.5810 535	84.260 082	18.393 17
37	4.6645 994	86.225 869	18.485 16	4.7399 433	87.998 666	18.565 35	4.7788 733	88.914 665	18.605 78
38	4.8628 449	90.890 468	18.590 80	4.9435 313	92.788 971	18.769 78	4.9852 353	93.770 242	18.809 59
39	5.0695 158	95.753 313	18.888 06	5.1559 637	97.785 027	18.965 79	5.2005 085	98.835 494	19.004 97
40	5.2849 702	100.82 283	19.077 28	5.3773 161	102.99 567	19.153 73	5.4250 777	104.11 947	19.192 26
41	5.5095 815	106.10 780	19.258 78	5.6082 802	108.43 012	19.333 98	5.6593 442	109.63 163	19.371 79
42	5.7437 387	111.61 738	19.432 88	5.8491 646	114.09 799	19.506 72	5.9037 269	115.38 181	19.543 89
43	5.9878 476	117.36 112	19.599 88	6.1003 953	120.00 930	19.672 38	6.1586 625	121.38 029	19.708 87
44	6.2423 311	123.34 897	19.760 08	6.3624 168	126.17 451	19.831 22	6.4246 068	127.63 781	19.867 02
45	6.5076 302	129.59 130	19.913 75	6.6356 926	132.60 453	19.983 53	6.7020 352	134.16 553	20.018 63
46	6.7842 045	136.09 893	20.061 15	6.9207 060	139.31 073	20.129 56	6.9914 435	140.97 514	20.163 95
47	7.0725 331	142.88 313	20.202 54	7.2179 611	146.30 497	20.269 57	7.2933 491	148.07 880	20.303 27
48	7.3731 158	149.95 567	20.338 17	7.5279 838	153.59 962	20.403 82	7.6082 916	155.48 922	20.436 81
49	7.6864 732	157.32 878	20.468 27	7.8513 225	161.20 759	20.532 54	7.9368 341	163.21 963	20.564 83
50	8.0131 483	165.01 525	20.593 06	8.1885 490	169.14 233	20.655 96	8.2795 637	171.28 385	20.687 55
51	8.3537 071	173.02 840	20.712 77	8.5402 600	177.41 788	20.774 30	8.6370 931	179.69 631	20.806 18
52	8.7087 397	181.38 211	20.827 60	8.9070 775	186.04 888	20.887 76	9.0100 613	188.47 203	20.917 95
53	9.0788 611	190.09 085	20.937 74	9.2896 504	195.05 060	20.996 55	9.3991 352	197.62 671	21.026 05
54	9.4647 127	199.16 971	21.043 40	9.6886 554	204.43 895	21.100 86	9.8050 101	207.17 671	21.129 68
55	9.8669 630	208.63 442	21.144 74	10.104 798	214.23 055	21.200 87	10.228 412	217.13 910	21.229 01
56	10.286 309	218.50 139	21.241 96	10.538 815	224.44 271	21.296 77	10.670 096	227.53 168	21.324 24
57	10.723 477	228.78 770	21.335 22	10.991 474	235.09 350	21.388 71	11.130 854	238.37 304	21.415 52
58	11.179 225	239.51 117	21.424 67	11.463 575	246.20 176	21.476 87	11.611 508	249.68 255	21.503 02
59	11.654 342	250.69 040	21.510 47	11.955 953	257.78 713	21.561 40	12.112 918	261.48 043	21.586 91
60	12.149 651	262.34 474	21.592 78	12.469 480	269.87 012	21.642 45	12.635 980	273.78 777	21.667 32
61	12.666 012	274.49 439	21.671 73	13.005 064	282.47 209	21.720 16	13.181 629	286.62 657	21.744 40
62	13.204 317	287.16 040	21.747 46	13.563 652	295.61 533	21.794 67	13.750 840	300.01 977	21.818 29
63	13.765 501	300.36 472	21.820 10	14.146 232	309.32 310	21.866 11	14.344 631	313.99 132	21.889 12
64	14.350 534	314.13 022	21.889 79	14.753 834	323.61 963	21.934 61	14.964 063	328.56 619	21.957 02
65	14.960 432	328.48 075	21.956 64	15.387 535	338.53 022	22.000 29	15.610 244	343.77 044	22.022 11
66	15.596 250	343.44 119	22.020 75	16.048 453	354.08 125	22.063 26	16.284 328	359.63 124	22.084 50
67	16.259 091	359.03 744	22.082 25	16.737 759	370.30 022	22.123 64	16.987 520	376.17 694	22.144 31
68	16.950 102	375.29 653	22.141 25	17.456 672	387.21 582	22.181 54	17.721 078	393.43 712	22.201 65
69	17.670 482	392.24 663	22.197 85	18.206 464	404.85 797	22.237 05	18.486 312	411.44 323	22.256 61
70	18.421 477	409.91 711	22.252 13	18.988 460	423.25 787	22.290 27	19.284 591	430.22 567	22.309 30
71	19.204 390	428.33 859	22.304 20	19.804 044	442.44 809	22.341 30	20.117 341	449.81 979	22.359 80
72	20.020 577	447.54 298	22.354 15	20.654 658	462.46 255	22.390 23	20.986 051	470.26 003	22.408 22
73	20.871 451	467.56 356	22.402 06	21.541 808	483.33 666	22.437 15	21.892 274	491.58 292	22.454 63
74	21.758 488	488.43 501	22.448 02	22.467 062	505.10 735	22.482 13	22.837 630	513.82 658	22.499 12
75	22.683 224	510.19 350	22.492 11	23.432 058	527.81 313	22.525 26	23.823 808	537.03 077	22.541 77
76	23.647 261	532.87 672	22.534 40	24.438 501	551.49 415	22.566 61	24.852 571	561.23 697	22.582 65
77	24.652 269	556.52 398	22.574 96	25.488 173	576.19 231	22.606 26	25.925 759	586.48 844	22.621 84
78	25.699 991	581.17 625	22.613 87	26.582 930	601.95 130	22.644 28	27.045 289	612.83 032	22.659 41
79	26.792 240	606.87 624	22.651 19	27.724 708	628.81 667	22.680 73	28.213 163	640.30 971	22.695 33
80	27.930 910	633.66 848	22.687 00	28.915 528	656.83 595	22.715 68	29.431 468	668.99 570	22.729 94
81	29.117 974	661.59 939	22.721 34	30.157 495	686.05 871	22.749 19	30.702 382	698.87 957	22.763 04
82	30.355 488	690.71 736	22.754 28	31.452 807	716.53 663	22.781 32	32.028 177	730.07 475	22.794 77
83	31.645 596	721.07 285	22.785 88	32.803 754	748.32 362	22.812 13	33.411 223	762.61 700	22.825 18
84	32.990 534	752.71 845	22.816 20	34.212 726	781.47 591	22.841 67	34.853 991	796.56 450	22.854 33
85	34.392 632	785.70 898	22.845 27	35.682 216	816.05 215	29.869 99	36.359 062	831.97 792	22.882 27
86	35.854 319	820.10 161	22.873 16	37.214 823	852.11 349	22.897 15	37.929 124	868.92 057	22.909 06
87	37.378 127	855.95 593	22.899 92	38.813 258	889.72 372	22.923 19	39.566 985	907.45 848	22.934 74
88	38.966 698	893.33 406	22.925 58	40.480 348	928.94 937	22.948 15	41.275 573	947.66 054	22.959 35
89	40.622 782	932.30 076	22.950 20	42.219 042	969.85 982	22.972 09	43.057 941	989.59 862	22.982 95
90	42.349 250	972.92 354	22.973 81	44.032 416	1012.5 274	22.995 04	44.917 276	1033.3 477	23.006 57
91	44.149 094	1015.2 728	22.996 46	45.923 677	1057.0 277	23.017 05	46.856 901	1078.9 869	23.027 26
92	46.025 430	1059.4 219	23.018 19	47.896 171	1103.4 393	23.038 15	48.880 283	1126.5 949	23.048 04
93	47.981 511	1105.4 473	23.039 03	49.953 386	1151.8 444	23.058 38	50.991 039	1176.2 597	23.067 97
94	50.020 725	1153.4 288	23.059 02	52.098 962	1202.3 285	23.077 78	53.192 941	1228.0 692	23.087 07
95	52.146 606	1203.4 496	23.078 20	54.336 694	1254.9 810	23.096 38	55.489 927	1282.1 159	23.105 38
96	54.362 837	1255.5 962	23.096 59	56.670 540	1309.8 951	23.114 21	57.886 102	1338.4 965	23.122 93
97	56.673 257	1309.9 590	23.114 94	59.104 628	1367.1 677	23.131 31	60.385 748	1397.3 117	23.139 76
98	59.081 871	1366.6 323	23.131 16	61.643 264	1426.9 003	23.147 70	62.993 335	1458.6 667	23.155 89
99	61.592 850	1425.7 141	23.147 40	64.290 939	1489.1 986	23.163 43	65.713 523	1522.6 711	23.171 35
100	64.210 546	1487.3 070	23.162 97	67.052 335	1554.1 726	23.178 50	68.551 174	1589.4 394	23.186 17
	Value of Perpetual Ann.		23.529 41	. . . .		23.529 41	. . . .		23.529 41

PERPETUAL STOCK: 3 p.C. 70,5882; 3½ p.C. 82,3529; 4 p.C. 94,1176; 5 p.C. 117,6

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0425.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02125.			RATIO *of* INTEREST: *QUARTERLY*, 0.010625.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity
26	0.3388 616	0.0217 831	0.0642 831	0.3350 676	0.0214 163	0.0639 163	0.3331 472	0.0212 322	0.0637 32
27	0.3250 471	0.0204 674	0.0629 674	0.3212 686	0.0201 168	0.0626 168	0.3193 567	0.0199 409	0.0624 40
28	0.3117 958	0.0192 549	0.0617 549	0.3080 379	0.0189 195	0.0614 195	0.3061 370	0.0187 513	0.0612 51
29	0.2990 847	0.0181 350	0.0606 350	0.2953 520	0.0178 138	0.0603 138	0.2934 646	0.0176 527	0,0601 52
30	0.2868 918	0.0170 982	0.0595 982	0.2831 887	0.0167 903	0.0592 903	0.2813 167	0.0166 359	0.0591 35
31	0.2751 959	0.0161 365	0.0586 365	0.2715 262	0.0158 411	0.0586 411	0.2696 717	0.0156 930	0.0581 93
32	0.2639 769	0.0152 428	0.0577 428	0.2603 440	0.0149 591	0.0574 591	0.2585 068	0.0148 169	0.0573 16
33	0.2532 153	0.0144 106	0.0569 106	0.2496 223	0.0141 381	0.0566 381	0.2478 079	0.0140 015	0.0565 01
34	0.2428 923	0.0136 347	0.0561 347	0.2393 422	0.0133 727	0.0558 727	0.2375 499	0.0132 414	0.0557 41
35	0.2329 903	0.0129 100	0.0554 100	0.2294 854	0.0126 579	0.0551 579	0.2277 166	0.0125 316	0.0550 31
36	0.2234 919	0.0122 322	0.0547 322	0.2200 346	0.0119 896	0.0544 896	0.2182 904	0.0118 680	0.0543 68
37	0.2143 807	0.0115 974	0.0540 974	0.2109 730	0.0113 638	0.0538 638	0.2092 543	0.0112 467	0.0537 46
38	0.2056 409	0.0110 023	0.0535 023	0.2022 846	0.0107 771	0.0532 771	0.2005 923	0.0106 644	0.0531 64
39	0.1972 575	0.0104 435	0.0529 435	0.1939 539	0.0102 264	0.0527 264	0.1922 889	0.0101 178	0.0526 17
40	0.1892 158	0.0099 184	0 0524 184	0.1859 664	0.0097 091	0.0522 091	0.1843 292	0.0096 044	0.0521 04
41	0.1815 020	0.0094 244	0.0519 244	0.1783 078	0.0092 225	0.0517 225	0.1766 989	0.0091 215	0.0516 21
42	0.1741 026	0.0089 592	0.0514 592	0.1709 646	0.0087 644	0.0512 644	0.1693 845	0 0086 669	0.0511 66
43	0.1670 049	0.0085 207	0.0510 207	0.1639 238	0.0083 327	0.0508 327	0.1623 729	0.0082 386	0.0507 38
44	0.1601 966	0.0081 071	0.0506 071	0.1571 730	0.0079 255	0.0504 255	0.1556 516	0.0078 347	0.0503 34
45	0.1536 658	0.0077 166	0.0502 166	0.1507 002	0.0075 412	0.0500 412	0.1492 084	0.0074 535	0.0499 53
46	0.1474 012	0.0073 476	0.0498 476	0.1444 939	0.0071 782	0.0496 782	0.1430 320	0.0070 934	0.0495 93
47	0.1413 921	0.0069 987	0.0494 987	0.1385 433	0.0068 350	0.0493 350	0.1371 112	0.0067 532	0.0492 53
48	0.1356 279	0.0066 686	0.0491 686	0.1328 377	0.0065 104	0.0490 104	0.1314 355	0.0064 313	0.0489 31
49	0.1300 987	0.0063 561	0.0488 561	0.1273 671	0.0062 032	0.0487 032	0.1259 948	0.0061 267	0.0486 26
50	0.1247 949	0.0060 600	0.0485 600	0 1221 218	0.0059 122	0.0484 122	0.1207 793	0.0058 383	0.0483 38
51	0.1197 073	0.0057 794	0.0482 794	0.1170 925	0.0056 364	0.0481 364	0.1157 797	0.0055 649	0.0480 64
52	0.1148 272	0.0055 132	0.0480 132	0.1122 703	0.0053 749	0.0478 749	0.1109 870	0.0053 058	0 0478 05
53	0.1101 460	0.0052 606	0.0477 606	0.1076 467	0.0051 269	0.0476 269	0.1063 928	0.0050 600	0.0475 60
54	0.1056 556	0.0050 208	0.0475 208	0.1032 135	0.0048 914	0.0473 914	0.1019 887	0.0048 268	0.0473 26
55	0.1013 483	0.0047 931	0.0472 931	0.0989 629	0.0046 679	0.0471 679	0.0977 669	0.0046 053	0.0471 05
56	0.0972 166	0.0045 766	0.0470 766	0.0948 873	0.0044 555	0.0469 555	0.0937 199	0.0043 950	0.0468 95
57	0.0932 533	0.0043 709	0.0468 709	0.0909 796	0.0042 536	0.0467 536	0.0898 404	0.0041 951	0.0466 95
58	0.0894 517	0.0041 752	0.0466 752	0.0872 328	0.0040 617	0.0465 617	0.0861 215	0.0040 051	0.0465 05
59	0.0858 049	0.0039 890	0.0464 890	0.0836 403	0.0038 792	0.0463 792	0.0825 565	0.0038 244	0.0463 24
60	0.0823 069	0.0038 118	0.0463 118	0.0801 958	0.0037 055	0.0462 055	0.0791 391	0.0036 525	0.0461 52
61	0.0789 515	0.0036 431	0.0461 431	0.0768 931	0.0035 402	0.0460 402	0.0758 632	0.0034 889	0.0459 88
62	0.0757 328	0.0034 824	0.0459 824	0.0737 264	0.0033 828	0.0458 828	0.0727 228	0.0033 331	0.0458 33
63	0 0726 454	0.0033 293	0.0458 293	0.0706 902	0.0032 329	0.0457 329	0.0697 125	0.0031 848	0.0456 84
64	0.0696 838	0.0031 834	0.0456 834	0.0677 790	0.0030 900	0.0455 900	0.0668 268	0.0030 435	0.0455 43
65	0.0668 430	0.0030 443	0.0455 443	0.0649 877	0.0029 539	0.0454 539	0.0640 605	0.0029 089	0.0454 08
66	0.0641 180	0.0029 117	0.0454 117	0.0623 113	0.0028 242	0.0453 242	0.0614 087	0.0027 806	0.0452 80
67	0.0615 041	0.0027 852	0.0452 852	0.0597 452	0.0027 005	0.0452 005	0.0588 667	0.0026 583	0.0451 58
68	0.0589 967	0.0026 646	0.0451 646	0.0572 847	0.0025 825	0.0450 825	0.0564 300	0.0025 417	0.0450 41
69	0.0565 916	0.0025 494	0.0150 494	0.0549 255	0.0024 700	0.0449 700	0.0540 941	0.0024 305	0.0449 30
70	0.0542 845	0.0024 395	0.0449 395	0.0526 636	0.0023 625	0.0448 626	0.0518 549	0.0023 244	0.0448 24
71	0.0520 714	0.0023 346	0.0448 346	0.0504 947	0.0022 602	0.0447 602	0.0497 084	0.0022 231	0.0447 23
72	0.0499 486	0.0022 344	0.0447 344	0.0484 152	0.0021 623	0.0446 623	0.0476 507	0.0021 265	0.0446 26
73	0.0479 123	0.0021 387	0.0446 387	0.0464 214	0.0020 689	0.0445 689	0.0456 782	0 0020 342	0.0445 34
74	0.0459 591	0.0020 474	0.0445 474	0.0445 096	0.0019 798	0.0444 798	0.0437 874	0.0019 462	0.0444 46
75	0.0440 855	0.0019 600	0.0444 600	0.0426 766	0.0018 946	0.0443 946	0.0419 748	0.0018 621	0.0443 62
76	0.0422 882	0.0018 766	0.0443 766	0.0409 190	0.0018 133	0.0443 133	0.0402 373	0.0017 818	0,0442 81
77	0.0405 642	0.0017 969	0.0442 969	0.0392 339	0.0017 355	0.0442 355	0.0385 717	0.0017 051	0.0442 05
78	0.0389 105	0.0017 206	0.0142 206	0.0376 181	0.0016 612	0.0441 612	0.0369 750	0.0016 318	0.0441 31
79	0.0373 242	0.0016 478	0.0441 478	0.0360 689	0.0015 903	0.0440 903	0.0354 444	0.0015 618	0.0440 61
80	0.0358 026	0.0015 781	0.0440 781	0.0345 835	0.0015 224	0.0440 224	0.0339 772	0.0014 948	0.0439 94
81	0.0343 430	0.0015 115	0.0440 115	0.0331 593	0.0014 576	0.0439 576	0 0325 708	0.0014 309	0,0439 30
82	0.0329 430	0.0014 478	0.0439 478	0.0317 937	0.0013 956	0.0438 956	0.0312 225	0.0013 697	0.0438 69
83	0.0316 000	0.0013 868	0.0438 868	0.0304 843	0.0013 363	0.0438 363	0.0299 301	0.0013 113	0.0438 11
84	0.0303 117	0.0013 285	0.0438 285	0.0292 289	0.0012 796	0.0437 796	0.0286 911	0.0012 554	0.0437 55
85	0.0290 760	0.0012 727	0.0437 727	0,0280 252	0,0012 254	0.0437 254	0.0275 035	0.0012 020	0.0437 02
86	0.0278 906	0.0012 194	0.0437 194	0.0268 710	0.0011 736	0.0436 736	0.0263 650	0.0011 509	0.0436 50
87	0.0267 536	0.0011 683	0.0136 683	0.0257 644	0.0011 239	0.0436 239	0.0252 736	0.0011 020	0.0436 02
88	0.0256 629	0.0011 194	0.0436 194	0.0247 033	0.0010 765	0.0435 765	0.0242 274	0.0010 552	0.0435 55
89	0.0246 167	0.0010 726	0.0435 726	0.0236 860	0.0010 311	0.0435 311	0.0232 245	0.0010 105	0.0435 10
90	0.0236 132	0.0010 278	0.0435 278	0.0227 105	0.0009 876	0.0434 876	0.0222 631	0.0009 677	0.0434 67
91	0.0226 505	0,0009 850	0.0434 850	0.0217 753	0.0009 460	0.0434 460	0.0213 416	0.0009 268	0.0434 26
92	0.0217 271	0.0009 439	0.0434 439	0.0208 785	0.0009 062	0.0434 062	0.0204 581	0.0008 876	0.0433 87
93	0.0208 414	0.0009 046	0.0434 046	0.0200 187	0.0008 682	0.0433 682	0.0196 113	0.0008 502	0.0433 50
94	0.0199 917	0.0008 670	0.0433 670	0.0191 942	0.0008 317	0.0433 317	0.0187 995	0.0008 143	0.0433 14
95	0.0191 767	0,0008 309	0.0433 309	0.0184 038	0.0007 968	0.0432 968	0.0180 213	0.0007 800	0.0432 80
96	0.0183 949	0.0007 964	0.0432 964	0.0176 459	0.0007 634	0.0432 634	0.0172 753	0.0007 471	0.0432 47
97	0.0176 450	0.0007 634	0.0432 634	0.0169 192	0.0007 314	0.0432 314	0.0165 602	0.0007 157	0.0432 15
98	0.0169 257	0.0007 317	6.0432 317	0.0162 224	0.0007 008	0.0432 008	0.0158 747	0.0006 856	0 0431 85
99	0.0162 357	0.0007 014	0.0432 014	0.0155 543	0.0006 715	0.0431 715	0.0152 176	0,0006 567	0.0431 56
100	0.0155 738	0.0006 724	0.0431 724	0.0149 137	0.0006 434	0.0431 434	0.0145 876	0.0006 292	0.0431 29
·	Ratio of Perpetual Ann.		0.0425 000	- - - - - - - - - -		0.0425 000	- - - - - - - -		0.0425 00

RATE OF INTEREST: 4½ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.045.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.0225.			RATIO *of* INTEREST: *QUARTERLY*, 0.01125.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
0¼	....	....	....	....	....	....	1.0112 500	0.2500 000	0.2472 19
½	....	....	....	1.0225 000	0.5000 000	0.4889 98	1.0226 266	0.5028 125	0.4916 87
¾	....	....	....	....	....	....	1.0341 311	0.7584 691	0.7334 36
1	1.0450 000	1.0000 000	0.9569 38	1.0455 063	1.0112 500	0.9672 35	1.0457 651	1.0170 019	0.9724 96
¼	....	....	....	....	....	....	1.0575 299	1.2784 432	1.2088 96
½	....	....	....	1.0690 301	1.5340 031	1.4349 48	1.0694 272	1.5428 257	1.4426 66
¾	....	....	....	....	....	....	1.0814 582	1.8101 825	1.6738 35
2	1.0920 250	2.0450 000	1.8726 68	1.0930 833	2.0685 182	1.8923 70	1.0936 246	2.0805 470	1.9024 32
¼	....	....	....	....	....	....	1.1059 279	2.3539 532	2.1284 87
½	....	....	....	1.1176 777	2.6150 599	2.3397 26	1.1183 696	2.6304 351	2.3520 27
¾	....	....	....	....	....	....	1.1309 512	2.9100 275	2.5730 80
3	1.1411 661	3.1370 250	2.7489 64	1.1428 254	3.1738 987	2.7772 38	1.1436 744	3.1927 653	2.7916 73
¼	....	....	....	....	....	....	1.1565 408	3.4786 840	3.0078 35
½	....	....	....	1.1685 390	3.7453 114	3.2051 23	1.1695 519	3.7678 192	3.2215 92
¾	....	....	....	....	....	....	1.1827 093	4.0602 071	3.4329 71
4	1.1925 186	4.2781 911	3.5875 26	1.1948 311	4.3295 809	3.6235 92	1.1960 148	4.3558 844	3.6419 99
¼	....	....	....	....	....	....	1.2094 709	4.6548 881	3.8487 01
½	....	....	....	1.2217 148	4.9269 965	4.0328 53	1.2230 765	4.9572 556	4.0531 93
¾	....	....	....	....	....	....	1.2368 361	5.2630 248	4.2552 32
5	1.2461 819	5.4707 097	4.3899 77	1.2492 034	5.5378 539	4.4331 08	1.2507 505	5.5722 338	4.4551 12
¼	....	....	....	....	....	....	1.2648 215	5.8849 214	4.6527 68
½	....	....	....	1.2773 105	6.1624 556	4.8245 56	1.2790 507	6.2011 268	4.8482 26
¾	....	....	....	....	....	....	1.2934 400	6.5208 895	5.0415 69
6	1.3022 601	6.7168 917	5.1578 72	1.3060 500	6.8011 109	5.2073 89	1.3079 912	6.8442 495	5.2326 48
¼	....	....	....	....	....	....	1.3227 061	7.1712 473	5.4216 48
½	....	....	....	1.3354 361	7.4541 359	5.5817 99	1.3375 866	7.5019 238	5.6085 32
¾	....	....	....	....	....	....	1.3526 344	7.8363 205	5.7933 76
7	1.3608 618	8.0191 518	5.8927 01	1.3654 834	8.1218 539	5.9479 70	1.3678 516	8.1744 791	5.9761 45
¼	....	....	....	....	....	....	1.3832 399	8.5164 420	6.1568 80
½	....	....	....	1.3962 068	8.8045 957	6.3060 83	1.3988 013	8.8622 519	6.3356 04
¾	....	....	....	....	....	....	1.4145 379	9.2119 523	6.5123 41
8	1.4221 006	9.3800 136	6.5958 86	1.4276 215	9.5026 991	6.6563 16	1.4304 514	9.5655 867	6.6871 11
¼	....	....	....	....	....	....	1.4465 440	9.9231 996	6.8599 36
½	....	....	....	1.4597 429	10.216 510	6.9988 42	1.4628 176	10.284 836	7.0308 39
¾	....	....	....	....	....	....	1.4792 743	10.650 540	7.1998 41
9	1.4860 951	10.802 114	7.2687 90	1.4925 872	10.946 381	7.3338 31	1.4959 161	11.020 359	7.3669 63
¼	....	....	....	....	....	....	1.5127 452	11.394 338	7.5322 25
½	....	....	....	1.5261 704	11.692 675	7.6614 48	1.5297 636	11.772 524	7.6956 49
¾	....	....	....	....	....	....	1.5469 734	12.154 965	7.8572 55
10	1.5529 694	12.288 209	7.9127 18	1.5605 092	12.455 760	7.9818 56	1.5643 769	12.541 708	8.0170 63
¼	....	....	....	....	....	....	1.5819 761	12.932 802	8.1750 93
½	....	....	....	1.5956 207	13.236 015	8.2952 14	1.5997 733	13.328 296	8.3313 66
¾	....	....	....	....	....	....	1.6177 708	13.728 240	8.4858 99
11	1.6228 530	13.841 179	8.5289 17	1.6315 221	14.033 825	8.6016 76	1.6359 707	14.132 682	8.6387 14
¼	....	....	....	....	....	....	1.6543 754	14.541 675	8.7898 28
½	....	....	....	1.6682 314	14.849 586	8.9013 95	1.6729 871	14.955 269	8.9392 64
¾	....	....	....	....	....	....	1.6918 082	15.373 516	9.0870 32
12	1.6958 814	15.464 032	9.1185 81	1.7057 666	15.683 702	9.1945 18	1.7108 410	15.796 468	9.2321 59
¼	....	....	....	....	....	....	1.7300 880	16.224 178	9.3776 61
½	....	....	....	1.7441 463	16.536 585	9.4811 91	1.7495 515	16.656 700	9.5205 54
¾	....	....	....	....	....	....	1.7692 340	17.094 088	9.6618 58
13	1.7721 961	17.1599 13	9.6828 52	1.7833 896	17.408 658	9.7615 56	1.7891 378	17.536 396	9.8015 90
¼	....	....	....	....	....	....	1.8092 656	17.983 681	9.9397 68
½	....	....	....	1.8235 159	18.300 353	10.035 75	1.8296 199	18.435 997	10.076 41
¾	....	....	....	....	....	....	1.8502 031	18.893 402	10.211 53
14	1.8519 449	18.932 109	10.222 83	1.8645 450	19.212 111	10.303 91	1.8710 179	19.356 953	10.345 15
¼	....	....	....	....	....	....	1.8920 668	19.823 707	10.477 28
½	....	....	....	1.9164 973	20.144 383	10.566 17	1.9133 526	20.296 724	10.607 94
¾	....	....	....	....	....	....	1.9348 778	20.775 062	10.737 14
15	1.9352 824	20.784 054	10.739 55	1.9493 934	21.097 632	10.822 66	1.9566 452	21.258 782	10.864 91
¼	....	....	....	....	....	....	1.9786 574	21.747 943	10.991 26
½	....	....	....	1.9932 548	22.072 329	11.073 51	2.0009 173	22.242 607	11.116 21
¾	....	....	....	....	....	....	2.0234 277	22 742 837	11.239 76
16	2.0223 702	22.719 337	11.234 01	2.0381 030	23.068 956	11.318 84	2.0461 912	23.248 694	11.361 94
17	2.1133 768	24.741 707	11.707 19	2.1308 495	25.129 988	11.793 41	2.1398 353	25.329 674	11.837 21
18	2.2084 788	26.855 084	12.159 99	2.2278 164	27.284 809	12.247 33	2.2377 651	27.505 891	12.291 68
19	2.3078 603	29.063 562	12.593 29	2.3291 960	29.537 689	12.681 50	2.3401 766	29.781 702	12.726 26
20	2.4117 140	31.371 423	13.007 94	2.4351 890	31.893 088	13.096 76	2.4472 750	32.161 666	13.141 83
21	2.5202 412	33.783 137	13 404 72	2.5460 053	34.355 673	13.493 95	2.5592 747	34.650 550	13.539 21
22	2.6336 520	36.303 378	13.784 42	2.6618 644	36.930 321	13.873 85	2.6764 002	37.253 337	13.919 20
23	2.7521 663	38.937 030	14.147 77	2.7829 959	39.622 131	14.237 22	2.7988 858	39.975 241	14.282 56
24	2.8760 138	41.689 196	14.495 48	2.9096 396	42.436 436	14.584 77	2.9269 771	42.821 713	14.630 01
25	3.0054 345	44.565 210	14.828 21	3.0420 464	45.378 809	14.917 20	3.0609 305	45.798 454	14.962 27

PERPETUAL STOCK: 3 p.C. 66,6667; 3½ p.C. 77,7778; 4 p.C. 88,8889; 5 p.C. 111,11

Years.	RATIO of INTEREST: ANNUALLY, 0.045.			RATIO of INTEREST: HALF-YEARLY, 0.0225.			RATIO of INTEREST: QUARTERLY, 0.01125.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity
0¼	····	····	····	····	····	····	0.9888 752	4.0000 000	4.0450 00
½	····	····	····	0.9779 950	2.0000 000	2.0450 000	0.9778 741	1.9888 130	2.0338 13
¾	····	····	····	····	····	····	0.9669 953	1.3184 452	1.3634 45
1	0.9569 378	1.0000 000	1.0450 000	0.9564 744	0.9888 752	1.0338 752	0.9562 377	0.9832 823	1.0282 82
¼	····	····	····	····	····	····	0.9455 997	0.7822 013	0.8272 01
½	····	····	····	0.9354 273	0.6518 891	0.6968 891	0.9350 800	0.6481 614	0.6931 61
¾	····	····	····	····	····	····	0.9246 774	0.5524 305	0.5974 30
2	0.9157 300	0.4889 976	0.5339 976	0.9148 434	0.4834 379	0.5284 379	0.9143 905	0.4806 428	0.5256 4
¼	····	····	····	····	····	····	0.9042 181	0.4248 173	0.4698 17
½	····	····	····	0.8947 123	0.3823 996	0.4273 996	0.8941 588	0.3801 653	0.4251 65
¾	····	····	····	····	····	····	0.8842 114	0.3436 394	0.3886 39
3	0.8762 966	0.3187 734	0.3637 734	0.8750 243	0.3150 699	0.3600 699	0.8743 747	0.3132 078	0.3582 07
¼	····	····	····	····	····	····	0.8646 474	0.2874 650	0.3324 65
½	····	····	····	0.8557 694	0.2670 005	0.3120 005	0.8550 283	0.2654 055	0.3104 05
¾	····	····	····	····	····	····	0.8455 163	0.2462 929	0.2912 92
4	0.8385 614	0.2337 437	0.2787 437	0.8369 384	0.2309 692	0.2759 692	0.8361 101	0.2295 745	0.2745 74
¼	····	····	····	····	····	····	0.8268 084	0.2148 279	0.2598 27
½	····	····	····	0.8185 216	0.2029 647	0.2479 647	0.8176 104	0.2017 245	0.2407 24
¾	····	····	····	····	····	····	0.8085 145	0.1900 048	0.2350 04
5	0.8024 510	0.1827 919	0.2277 919	0.8005 101	0.1805 754	0.2255 754	0.7995 200	0.1794 612	0.2244 61
¼	····	····	····	····	····	····	0.7906 254	0.1699 258	0.2149 25
½	····	····	····	0.7828 950	0.1622 730	0.2072 730	0.7818 298	0.1612 610	0.2062 61
¾	····	····	····	····	····	····	0.7731 321	0 1533 533	0.1983 53
6	0.7678 957	0.1488 784	0.1938 784	0.7656 675	0.1470 348	0.1920 348	0.7645 311	0.1461 081	0.1911 08
¼	····	····	····	····	····	····	0.7560 259	0.1394 457	0.1844 45
½	····	····	····	0.7488 191	0.1341 537	0.1791 537	0.7476 152	0.1332 991	0.1782 99
¾	····	····	····	····	····	····	0.7392 980	0.1276 109	0.1726 10
7	0.7348 284	0.1247 015	0.1697 015	0.7323 413	0.1231 246	0.1681 246	0.7310 736	0.1223 319	0.1673 31
¼	····	····	····	····	····	····	0.7229 404	0.1174 199	0.1624 19
½	····	····	····	0.7162 263	0.1135 771	0.1585 771	0.7148 978	0.1128 382	0.1578 38
¾	····	····	····	····	····	····	0.7069 448	0.1085 546	0.1535 54
8	0.7031 851	0.1066 097	0.1516 097	0.7004 659	0.1052 333	0.1502 333	0 6990 800	0.1045 414	0.1495 41
¼	····	····	····	····	····	····	0.6913 029	0.1007 740	0.1457 74
½	····	····	····	0.6850 521	0.0978 808	0.1428 808	0.6836 122	0.0972 304	0.1422 30
¾	····	····	····	····	····	····	0.6760 072	0.0938 920	0.1388 92
9	0.6729 044	0.0925 745	0.1375 745	0.6699 776	0.0913 544	0.1363 544	0.6684 867	0.0907 412	0.1357 41
¼	····	····	····	····	····	····	0.6610 499	0.0877 629	0.1327 62
½	····	····	····	0.6552 348	0.0855 236	0.1305 236	0.6536 958	0.0849 436	0.1299 43
¾	····	····	····	····	····	····	0.6464 235	0.0822 709	0.1272 70
10	0.6439 277	0.0813 788	0.1263 788	0.6408 165	0.0802 841	0.1252 841	0.6392 322	0.0797 338	0.1247 33
¼	····	····	····	····	····	····	0.6321 208	0.0773 228	0.1223 22
½	····	····	····	0.6267 153	0.0755 514	0.1205 514	0.6250 885	0.0750 283	0.1200 28
¾	····	····	····	····	····	····	0.6181 345	0.0728 425	0.1178 42
11	0.6161 988	0.0722 482	0.1172 482	0.6129 246	0.0712 564	0.1162 564	0.6112 579	0.0707 580	0.1157 58
¼	····	····	····	····	····	····	0.6044 577	0.0687 679	0.1137 67
½	····	····	····	0.5994 372	0.0673 419	0.1123 419	0.5977 332	0.0668 661	0.1118 66
¾	····	····	····	····	····	····	0.5910 835	0.0650 469	0.1100 46
12	0.5896 639	0.0646 662	0.1096 662	0.5862 467	0.0637 605	0.1087 605	0.5845 078	0.0633 053	0.1083 05
¼	····	····	····	····	····	····	0.5780 053	0.0616 364	0.1066 36
½	····	····	····	0.5733 464	0.0604 720	0.1054 720	0.5715 751	0.0600 355	0.1050 35
¾	····	····	····	····	····	····	0.5652 164	0.0584 998	0.1034 99
13	0.5642 716	0.0582 754	0.1032 754	0.5607 300	0.0574 427	0.1024 427	0.5589 284	0.0570 243	0.1020 24
¼	····	····	····	····	····	····	0.5527 104	0.0556 060	0.1006 06
½	····	····	····	0.5483 912	0.0546 438	0.0996 438	0.5465 616	0.0542 417	0.0992 41
¾	····	····	····	····	····	····	0.5404 812	0.0529 285	0.0979 28
14	0.5399 728	0.0528 203	0.0978 203	0.5363 239	0.0520 505	0.0970 505	0.5344 684	0.0516 637	0.0966 63
¼	····	····	····	····	····	····	0.5285 226	0.0504 446	0.0954 44
½	····	····	····	0.5245 221	0.0496 416	0.0946 416	0.5226 428	0.0492 690	0.0942 69
¾	····	····	····	····	····	····	0.5168 285	0.0481 344	0.0931 34
15	0.5167 204	0.0481 138	0.0931 138	0.5129 801	0.0473 987	0.0923 987	0.5110 789	0.0470 394	0.0920 39
¼	····	····	····	····	····	····	0.5053 932	0.0459 814	0.0909 81
½	····	····	····	0.5016 920	0.0453 056	0.0903 056	0.4997 708	0.0449 588	0.0899 58
¾	····	····	····	····	····	····	0.4942 109	0.0439 699	0.0889 69
16	0.4944 693	0.0440 154	0.0890 154	0.4906 523	0.0433 483	0.0883 483	0.4887 129	0.0430 132	0.0880 13
17	0.4731 764	0.0404 176	0.0854 176	0.4692 964	0.0397 931	0.0847 931	0.4673 257	0.0394 794	0.0844 79
18	0.4528 004	0.0372 369	0.0822 369	0.4488 700	0.0366 504	0.0816 504	0.4468 744	0.0363 559	0.0813 55
19	0.4333 018	0.0344 073	0.0794 073	0.4293 327	0.0338 551	0.0788 551	0.4273 182	0.0335 777	0.0785 77
20	0.4146 429	0.0318 761	0.0768 761	0.4106 458	0.0313 548	0.0763 548	0.4086 178	0.0310 929	0.0760 92
21	0.3967 874	0.0296 006	0.0746 006	0.3927 721	0.0291 073	0.0741 073	0.3907 357	0.0288 596	0.0738 59
22	0.3797 009	0.0275 456	0.0725 456	0.3756 765	0.0270 780	0.0720 780	0.3736 362	0.0268 432	0.0718 43
23	0.3633 501	0.0256 825	0.0706 825	0.3593 250	0.0252 384	0.0702 384	0.3572 850	0.0250 155	0 0700 15
24	0.3477 035	0.0239 870	0.0689 870	0.3436 852	0.0235 647	0.0685 647	0.3416 494	0.0233 526	0.0683 52
25	0.3327 306	0.0224 390	0.0674 390	0.3287 261	0.0220 367	0.0670 367	0.3266 981	0.0218 348	0.0668 34

RATE of INTEREST: 4½ *per Cent. per Ann.*——CORRESPONDING VALUE of

Years.	RATIO of INTEREST: *ANNUALLY*, 0.045.			RATIO of INTEREST: *HALF-YEARLY*, 0.0225.			RATIO of INTEREST: *QUARTERLY*, 0.01125.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	3.1406 790	47.570 645	15.146 61	3.1804 785	48.455 078	15.235 15	3.2010 142	48.911 427	15.279 98
27	3.2820 096	50.711 324	15.451 30	3.3252 102	51.671 337	15.539 27	3.3475 089	52.166 864	15.583 79
28	3.4297 000	53.993 333	15.742 87	3.4765 280	55.033 956	15.830 15	3.5007 079	55.571 287	15.874 30
29	3.5840 365	57.423 033	16.021 89	3.6347 318	58.549 595	16.108 37	3.6609 181	59.131 514	16.152 10
30	3.7453 181	61.007 070	16.288 89	3.8001 348	62.225 217	16.374 48	3.8284 604	62.854 675	16.417 74
31	3.9138 575	64.752 388	16.544 39	3.9730 647	66.068 104	16.629 00	4.0036 702	66.748 226	16.671 76
32	4.0899 810	68.666 245	16.788 89	4.1538 639	70.085 865	16.872 49	4.1868 985	70.819 966	16.914 66
33	4.2740 302	72.756 226	17.022 86	4.3428 907	74.286 460	17.105 30	4.3785 123	75.078 050	17.146 93
34	4.4663 615	77.030 256	17.246 76	4 5405 194	78.678 209	17.328 02	4.5788 952	79.531 006	17.369 04
35	4.6673 478	81.496 618	17.461 01	4.7471 414	83.269 809	17.541 04	4.7884 488	84.187 751	17.581 42
36	4.8773 785	86.163 966	17.666 04	4.9631 660	88.070 355	17.744 79	5.0075 926	89.057 612	17.784 51
37	5.0968 605	91.041 344	17.862 24	5.1890 211	93.089 357	17.939 68	5.2367 655	94.150 344	17.978 72
38	5.3262 192	96.138 205	18.049 99	5.4251 540	98.336 755	18.126 08	5.4764 265	99.476 144	18.164 43
39	5.5658 991	101.46 442	18.229 66	5.6720 324	103.82 294	18.304 36	5.7270 556	105.04 568	18.342 00
40	5.8163 645	107.03 032	18.401 58	5.9301 453	109.55 878	18.474 89	5.9891 548	110.87 011	18.511 81
41	6.0781 009	112.84 669	18.566 11	6.2000 040	115.55 564	18.637 99	6.2632 490	116.96 109	18.674 19
42	6.3516 155	118.92 479	18.723 55	6.4821 429	121.82 540	18.794 00	6.5498 871	123.33 083	18.829 47
43	6.6374 382	125.27 640	18.874 21	6.7771 209	128.38 046	18.943 22	6.8496 433	129.99 207	18.977 94
44	6.9361 229	131.91 384	19.018 38	7.0855 223	135 23 383	19.085 94	7.1631 178	136.95 817	19.119 91
45	7.2482 484	138.84 997	19.156 35	7.4079 578	142.39 906	19.222 44	7.4909 385	144.24 308	19.255 67
46	7.5744 196	146.09 821	19.288 37	7.7450 662	149.89 036	19.353 01	7.8337 619	151.86 138	19.385 50
47	7.9152 685	153.67 263	19.414 71	8.0975 151	157.72 256	19.477 90	8.1922 747	159.82 833	19.509 64
48	8.2714 556	161.58 790	19.535 61	8.4660 027	165.91 117	19.597 34	8.5671 949	168.15 989	19.628 35
49	8.6436 711	169.85 936	19.651 30	8.8512 587	174.47 242	19.711 59	8.9592 733	176.87 274	19.741 86
50	9.0326 363	178.50 303	19.762 01	9.2540 463	183.42 325	19.820 87	9.3692 952	185.98 434	19.850 41
51	9.4391 049	187.53 566	19.867 95	9.6751 632	192.78 141	19.925 39	9.7980 818	195.51 293	19.954 20
52	9.8638 646	196.97 477	19.969 33	10.115 444	202.56 541	20.025 36	10.246 492	205.47 760	20.053 46
53	10.307 739	206.83 863	20.066 34	10.575 760	212.79 466	20.120 98	10.715 423	215.89 830	20.148 37
54	10.771 587	217.14 637	20.159 18	11.057 023	223.48 939	20.212 44	11.205 816	226.79 591	20.239 12
55	11.256 308	227.91 796	20.248 02	11.560 186	234.67 081	20.299 92	11.718 651	238.19 224	20.325 91
56	11.762 842	239.17 427	20.333 03	12.086 247	246.36 105	20.383 59	12.254 956	250.11 013	20.408 90
57	12.292 170	250.93 711	20.414 39	12.636 247	258.58 326	20.463 61	12.815 805	262.57 345	20.488 25
58	12.845 318	263.22 928	20.492 24	13.211 275	271.36 167	20.540 16	13.402 322	275.60 714	20.564 14
59	13.423 357	276.07 460	20.566 73	13.812 471	284.72 157	20.613 37	14.015 680	289.23 733	20.636 70
60	14.027 408	289.49 795	20.638 02	14.441 024	298.68 944	20.683 40	14.657 109	303.49 130	20.706 08
61	14.658 641	303.52 536	20.706 24	15.098 181	313.29 292	20.750 37	15.327 893	318.39 761	20.772 43
62	15.318 280	318.18 400	20.771 52	15.785 243	328.56 095	20.814 44	16.029 375	333.98 611	20.835 88
63	16.007 603	333.50 228	20.833 99	16.503 570	344.52 378	20.875 71	16.762 961	350.28 801	20.896 55
64	16.727 945	349.50 989	20.893 77	17.254 586	361.21 301	20.934 32	17.530 119	367.33 598	20.954 56
65	17.480 702	366.23 783	20.950 98	18.039 777	378.66 171	20.990 38	18.332 386	385.16 414	21.010 04
66	18.267 334	383.71 853	21.005 72	18.860 700	396.90 444	21.043 99	19.171 370	403.80 821	21.063 09
67	19.089 364	401.98 587	21.058 11	19.718 979	415.97 732	21.095 27	20.048 749	423.30 553	21.113 81
68	19.948 385	421.07 523	21.108 24	20.616 316	435.91 814	21.144 33	20 966 282	443.69 515	21.162 32
69	20.846 063	441.02 362	21.156 21	21.554 488	456.76 639	21.191 24	21.925 805	465.01 790	21,208 70
70	21.784 136	461.86 968	21.202 11	22.535 351	478.56 337	21.236 12	22.929 242	487.31 648	21.253 06
71	22,764 422	483.65 382	21.246 04	23.560 851	501.35 224	21.279 04	23.978 601	510.63 557	21.295 47
72	23.788 821	506.41 824	21.288 08	24.633 017	525.17 815	21.320 09	25.075 983	535.02 185	21.336 03
73	24.859 318	530.20 706	21.328 31	25.753 973	550 08 829	21.359 36	26.223 588	560 52 417	21.374 81
74	25.977 987	555.06 638	21.366 80	26.925 940	576.13 199	21.396 91	27.423 713	587.19 361	21.411 89
75	27.146 996	581.04 436	21.403 63	28.151 238	603.36 085	21.432 83	28.678 761	615.08 358	21.447 35
76	28.368 611	608.19 136	21.438 88	29.432 296	631.82 879	21.467 19	29.991 247	644.24 993	21.481 27
77	29.645 199	636.55 997	21.472 62	30.771 649	661.59 220	21.500 05	31.363 799	674 75 109	21.513 69
78	30.979 233	666.20 517	21.504 90	32.171 951	692.71 003	21.531 48	32.799 166	706 64 813	21 544 70
79	32.373 298	697.18 440	21.535 79	33 635 976	725.24 391	21.561 55	34.300 223	740.00 495	21.574 35
80	33.830 096	729.55 770	21.565 35	35.166 623	759.25 829	21.590 31	35.869 975	774.88 834	21.602 70
81	35.352 451	763.38 779	21.593 63	36.766 924	794.82 054	21.617 82	37.511 568	811.36 818	21.629 88
82	36.943 311	798.74 025	21.620 70	38.440 049	832.00 109	21.644 12	39.228 288	849.51 751	21.655 74
83	38 605 760	835.68 356	21.646 61	40.189 312	870.87 359	21.669 29	41.023 574	889.41 276	21.680 53
84	40.343 019	874.28 932	21.671 39	42.018 177	911 51 504	21.693 35	42.901 021	931.13 381	21.704 23
85	42.158 455	914.63 234	21.695 11	43.930 266	954.00 592	21.716 37	44.864 390	974.76 423	21.726 90
86	44.055 586	956.79 079	21.717 81	45.929 368	998.43 040	21.738 39	46.917 613	1020.3 914	21.748 58
87	46.038 087	1000.8 464	21.739 53	48.019 441	1044.8 765	21.759 45	49.064 802	1068.1 067	21.769 31
88	48.109 801	1046.8 845	21.760 32	50.204 626	1093.4 361	21.779 59	51.310 257	1118.0 057	21.789 13
89	50.274 742	1094.9 943	21.780 21	52.489 250	1144.2 056	21.798 85	58.658 475	1170.1 883	21.808 08
90	52.537 105	1145.2 690	21.799 24	54.877 839	1197.2 853	21.817 28	56.114 160	1234.7 591	21.826 20
91	54.901 275	1197.8 061	21.817 46	57.375 124	1252.7 805	21.834 91	58.682 229	1281.8 273	21.843 54
92	57.371 832	1252.7 074	21.834 89	59.986 051	1310.8 011	21.851 77	61.367 826	1341.5 073	21.860 11
93	59.953 565	1310.0 792	21.851 57	62.715 791	1371.4 620	21.867.89	64.176 330	1403.9 184	21.875 95
94	62.651 475	1370.0 328	21.867 53	65.569 751	1434.8 834	21.883 31	67.113 365	1469.1 859	21.891 11
95	65.470 792	1432.6 843	21.882 80	68.553 585	1501.1 908	21.898 06	70.184 814	1537.4 403	21.905 60
96	68.416 977	1498.1 551	21.897 42	71.673 201	1570.5 156	21.912 17	73.396 828	1608.8 184	21.919 46
97	71.495 741	1566.5 720	21.911 41	74.934 780	1642.9 951	21.925 67	76.755 841	1683.4 631	21.932 70
98	74.713 050	1638.0 678	21.924 79	78.344 781	1718.7 729	21.938 58	80.268 577	1761.5 239	21.945 37
99	78.075 137	1712.7 808	21.937 60	81.909 958	1797.9 991	21.950 93	83.942 076	1843.1 572	21.957 49
100	81.588 518	1790.8 560	21.949 85	85.637 373	1880.8 305	21.962 73	87.783 692	1928.5 265	21.969 07
	Value of Perpetual Ann.		22.222 22	- - - - - - - - - -		22.222 22	- - - - - - - - - -		22.222 22

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.045.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.0225.			RATIO *of* INTEREST: *QUARTERLY*, 0.01125.		
	Discounted Principal.	**Annuity for Cumulation**	**Ratio of Annuity.**	**Discounted Principal.**	**Annuity for Cumulation**	**Ratio of Annuity.**	**Discounted Principal.**	**Annuity for Cumulation**	**Ratio of Annuity.**
26	0.3184 025	0.0210 214	0.0660 214	0.3144 181	0.0206 377	0.0656 377	0.3124 010	0.0204 451	0.0654 451
27	0.3046 914	0.0197 195	0.0647 195	0.3007 329	0.0193 531	0.0643 531	0.2987 296	0.0191 693	0.0641 693
28	0.2915 707	0.0185 208	0.0635 208	0.2876 433	0.0181 706	0.0631 706	0.2856 565	0.0179 949	0.0629 949
29	0.2790 150	0.0174 145	0.0624 145	0.2751 235	0.0170 795	0.0620 795	0.2731 555	0.0169 114	0.0619 114
30	0.2670 000	0.0163 915	0.0613 915	0.2631 486	0.0160 707	0.0610 707	0.2612 016	0.0159 097	0.0609 097
31	0.2555 024	0.0154 434	0.0604 434	0.2516 949	0.0151 359	0.0601 359	0.2497 708	0.0149 817	0.0599 817
32	0.2444 999	0.0145 632	0.0595 632	0.2407 397	0.0142 682	0.0592 682	0.2388 403	0.0141 203	0.0591 203
33	0.2339 712	0.0137 445	0.0587 445	0.2302 614	0.0134 614	0.0584 614	0.2283 881	0.0133 195	0.0583 195
34	0.2238 959	0.0129 819	0.0579 819	0.2202 391	0.0127 100	0.0577 100	0.2183 933	0.0125 737	0.0575 737
35	0.2142 544	0.0122 704	0.0572 704	0.2106 531	0.0120 092	0.0570 092	0.2088 359	0.0118 782	0.0568 782
36	0.2050 282	0.0116 058	0.0566 058	0.2014 843	0.0113 546	0.0563 546	0.1996 968	0.0112 287	0.0562 287
37	0.1961 992	0.0109 840	0.0559 840	0.1927 146	0.0107 424	0.0557 424	0.1909 576	0.0106 213	0.0556 213
38	0.1877 504	0.0104 017	0.0554 017	0.1843 266	0.0101 691	0.0551 691	0.1826 008	0.0100 526	0.0550 526
39	0.1796 655	0.0098 557	0.0548 557	0.1763 037	0.0096 318	0.0546 318	0.1746 098	0.0095 197	0.0545 197
40	0.1719 287	0.0093 431	0.0543 431	0.1686 299	0.0091 275	0.0541 275	0.1669 685	0.0090 196	0.0540 196
41	0.1645 251	0.0088 616	0.0538 616	0.1612 902	0.0086 538	0.0536 538	0.1596 616	0.0085 499	0.0535 499
42	0.1574 403	0.0084 087	0.0534 087	0.1542 700	0.0082 084	0.0532 084	0.1526 744	0.0081 083	0.0531 083
43	0.1506 605	0.0079 823	0.0529 823	0.1475 553	0.0077 893	0.0527 893	0.1459 930	0.0076 928	0.0526 928
44	0.1441 728	0.0075 807	0.0525 807	0.1411 329	0.0073 946	0.0523 946	0.1396 040	0.0073 015	0.0523 015
45	0.1379 644	0.0072 020	0.0522 020	0.1349 900	0.0070 225	0.0520 225	0.1334 946	0.0069 327	0.0519 327
46	0.1320 233	0.0068 445	0.0518 445	0.1291 145	0.0066 715	0.0516 715	0.1276 526	0.0065 850	0.0515 850
47	0.1263 381	0.0065 073	0.0515 073	0.1234 947	0.0063 402	0.0513 402	0.1220 662	0.0062 567	0.0512 567
48	0.1208 977	0.0061 886	0.0511 886	0.1181 195	0.0060 273	0.0510 273	0.1167 243	0.0059 467	0.0509 467
49	0.1156 916	0.0058 872	0.0508 872	0.1129 783	0.0057 316	0.0507 316	0.1116 162	0.0056 538	0.0506 538
50	0.1107 096	0.0056 021	0.0506 021	0.1080 608	0.0054 519	0.0504 519	0.1067 316	0.0053 768	0.0503 768
51	0.1059 422	0.0053 323	0.0503 323	0.1033 574	0.0051 872	0.0501 872	0.1020 608	0.0051 148	0.0501 148
52	0.1013 801	0.0050 768	0.0500 768	0.0988 587	0.0049 367	0.0499 367	0.0975 944	0.0048 667	0.0498 667
53	0.0970 145	0.0048 347	0.0498 347	0.0945 559	0.0046 994	0.0496 994	0.0933 234	0.0046 318	0.0496 318
54	0.0928 368	0.0046 052	0.0496 052	0.0904 403	0.0044 745	0.0494 745	0.0892 394	0.0044 093	0.0494 093
55	0.0888 391	0.0043 876	0.0493 876	0.0865 038	0.0042 613	0.0492 613	0.0853 341	0.0041 983	0.0491 983
56	0.0850 135	0.0041 811	0.0491 811	0.0827 387	0.0040 591	0.0490 591	0.0815 997	0.0039 982	0.0489 982
57	0.0813 526	0.0039 851	0.0489 851	0.0791 374	0.0038 672	0.0488 672	0.0780 287	0.0038 085	0.0488 085
58	0.0778 494	0.0037 990	0.0487 990	0.0756 929	0.0036 851	0.0486 851	0.0746 139	0.0036 284	0.0486 284
59	0.0744 970	0.0036 222	0.0486 222	0.0723 983	0.0035 122	0.0485 122	0.0713 487	0.0034 574	0.0484 574
60	0.0712 890	0.0034 543	0.0184 543	0.0692 472	0.0033 480	0.0483 480	0.0682 263	0.0032 950	0.0482 950
61	0.0682 192	0.0032 946	0.0482 946	0.0662 331	0.0031 919	0.0481 919	0.0652 405	0.0031 407	0.0481 407
62	0.0652 815	0.0031 428	0.0481 428	0.0633 503	0.0030 436	0.0480 436	0.0623 855	0.0029 941	0.0479 941
63	0.0624 703	0.0029 985	0.0479 985	0.0605 929	0.0029 026	0.0479 026	0.0596 553	0.0028 548	0.0478 548
64	0.0597 802	0.0028 611	0.0478 611	0.0579 556	0.0027 684	0.0477 684	0.0570 447	0.0027 223	0.0477 223
65	0.0572 059	0.0027 305	0.0477 305	0.0554 331	0.0026 409	0.0476 409	0.0545 483	0.0025 963	0.0475 963
66	0.0547 425	0.0026 061	0.0476 061	0.0530 203	0.0025 195	0.0475 195	0.0521 611	0.0024 764	0.0474 764
67	0.0523 852	0.0024 877	0.0474 877	0.0507 126	0.0024 040	0.0474 040	0.0498 784	0.0023 624	0.0473 624
68	0.0501 294	0.0023 749	0.0473 749	0.0485 053	0.0022 940	0.0472 940	0.0476 956	0.0022 538	0.0472 538
69	0.0479 707	0.0022 675	0.0472 675	0.0463 941	0.0021 893	0.0471 893	0.0456 084	0.0021 505	0.0471 505
70	0.0459 050	0.0021 651	0.0471 651	0.0443 747	0.0020 896	0.0470 896	0.0436 124	0.0020 521	0.0470 521
71	0.0439 282	0.0020 676	0.0470 676	0.0424 433	0.0019 946	0.0469 946	0.0417 039	0.0019 583	0.0469 583
72	0.0420 365	0.0019 747	0.0469 747	0.0405 959	0.0019 041	0.0469 041	0.0398 788	0.0018 691	0.0468 691
73	0.0402 264	0.0018 861	0.0468 861	0.0388 290	0.0018 179	0.0468 179	0.0381 336	0.0017 840	0.0467 840
74	0.0384 941	0.0018 016	0.0468 016	0.0371 389	0.0017 357	0.0467 357	0.0364 648	0.0017 030	0.0467 030
75	0.0368 365	0.0017 210	0.0467 210	0.0355 224	0.0016 574	0.0466 574	0.0348 690	0.0016 258	0.0466 258
76	0.0352 502	0.0016 442	0.0466 442	0.0339 763	0.0015 827	0.0465 827	0.0333 431	0.0015 522	0.0465 522
77	0.0337 323	0.0015 709	0.0465 709	0.0324 974	0.0015 115	0.0465 115	0.0318 839	0.0014 820	0.0464 820
78	0.0322 797	0.0015 010	0.0465 010	0.0310 830	0.0014 436	0.0464 436	0.0304 886	0.0014 151	0.0464 151
79	0.0308 897	0.0014 343	0.0464 343	0.0297 301	0.0013 788	0.0463 788	0.0291 543	0.0013 513	0.0463 513
80	0.0295 595	0.0013 707	0.0463 707	0.0284 361	0.0013 171	0.0463 171	0.0278 785	0.0012 905	0.0462 905
81	0.0282 866	0.0013 100	0.0463 100	0.0271 984	0.0012 581	0.0462 581	0.0266 584	0.0012 325	0.0462 325
82	0.0270 685	0.0012 520	0.0462 520	0.0260 145	0.0012 019	0.0462 019	0.0254 918	0.0011 771	0.0461 771
83	0.0259 029	0.0011 966	0.0461 966	0.0248 882	0.0011 483	0.0461 483	0.0243 762	0.0011 243	0.0461 243
84	0.0247 874	0.0011 438	0.0461 438	0.0237 992	0.0010 971	0.0460 971	0.0233 095	0.0010 740	0.0460 740
85	0.0237 200	0.0010 933	0.0460 933	0.0227 633	0.0010 482	0.0460 482	0.0222 894	0.0010 259	0.0460 259
86	0.0226 986	0.0010 452	0.0460 452	0.0217 726	0.0010 016	0.0460 016	0.0213 140	0.0009 800	0.0459 800
87	0.0217 211	0.0009 992	0.0459 992	0.0208 249	0.0009 571	0.0459 571	0.0203 812	0.0009 362	0.0459 362
88	0.0207 858	0.0009 552	0.0459 552	0.0199 185	0.0009 145	0.0459 145	0.0194 893	0.0008 944	0.0458 944
89	0.0198 907	0.0009 133	0.0459 133	0.0190 515	0.0008 740	0.0458 740	0.0186 364	0.0008 546	0.0458 546
90	0.0190 342	0.0008 732	0.0458 732	0.0182 223	0.0008 352	0.0458 352	0.0178 208	0.0008 165	0.0458 165
91	0.0182 145	0.0008 349	0.0458 349	0.0174 292	0.0007 982	0.0457 982	0.0170 409	0.0007 801	0.0457 801
92	0.0174 302	0.0007 983	0.0457 983	0.0166 705	0.0007 629	0.0457 629	0.0162 952	0.0007 454	0.0457 454
93	0.0166 796	0.0007 633	0.0457 633	0.0159 449	0.0007 291	0.0457 291	0.0155 821	0.0007 123	0.0457 123
94	0.0159 613	0.0007 299	0.0457 299	0.0152 509	0.0006 969	0.0456 969	0.0149 002	0.0006 806	0.0456 806
95	0.0152 740	0.0006 980	0.0456 980	0.0145 871	0.0006 661	0.0456 661	0.0142 481	0.0006 504	0.0456 504
96	0.0146 163	0.0006 675	0.0456 675	0.0139 522	0.0006 367	0.0456 367	0.0136 246	0.0006 216	0.0456 216
97	0.0139 868	0.0006 383	0.0456 383	0.0133 449	0.0006 086	0.0456 086	0.0130 283	0.0005 940	0.0455 940
98	0.0133 845	0.0006 105	0.0456 105	0.0127 641	0.0005 818	0.0455 818	0.0124 582	0.0005 677	0.0455 677
99	0.0128 082	0.0005 838	0.0455 838	0.0122 085	0.0005 562	0.0455 562	0.0119 130	0.0005 425	0.0455 425
100	0.0122 566	0.0005 584	0.0455 584	0.0116 771	0.0005 317	0.0455 317	0.0113 916	0.0005 185	0.0455 185
	Ratio of Perpetual Ann.		0.0450 000	- - - - - - - - - -		0.0450 000	- - - - - - - -		0.0450 000

RATE OF INTEREST: 4¾ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0475.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02375.			RATIO *of* INTEREST: *QUARTERLY*, 0.011875.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
0¼	....	....	....	....	....	....	1.0118 750	0.2500 000	0.2470 66
½	....	....	....	1.0237 500	0.5000 000	0.4884 00	1.0238 910	0.5029 688	0.4912 33
¾	....	....	....	....	....	....	1.0360 497	0.7589 415	0.7325 34
1	1.0475 000	1.0000 000	0.9546 54	1.0480 641	1.0118 750	0.9654 71	1.0483 528	1.0179 539	0.9710 03
¼	....	....	....	....	....	....	1.0608 020	1.2800 421	1.2066 74
½	....	....	....	1.0729 556	1.5359 070	1.4314 73	1.0733 990	1.5452 426	1.4395 79
¾	....	....	....	....	....	....	1.0861 456	1.8135 924	1.6697 51
2	1.0972 563	2.0475 000	1.8660 18	1.0984 383	2.0723 848	1.8866 65	1.0990 436	2.0851 288	1.8972 21
¼	....	....	....	....	....	....	1.1120 948	2.3598 897	2.1220 22
½	....	....	....	1.1245 262	2.6216 040	2.3312 96	1.1253 009	2.6379 134	2.3441 85
¾	....	....	....	....	....	....	1.1386 638	2.9192 386	2.5637 41
3	1.1493 759	3.1447 563	2.7360 55	1.1512 337	3.1838 671	2.7656 13	1.1521 855	3.2039 046	2.7807 20
¼	....	....	....	....	....	....	1.1658 677	3.4919 509	2.9951 52
½	....	....	....	1.1785 753	3.7594 839	3.1898 54	1.1797 123	3.7834 179	3.2070 68
¾	....	....	....	....	....	....	1.1937 214	4.0783 460	3.4164 97
4	1.2039 713	4.2941 322	3.5666 40	1.2065 667	4.3487 716	3.6042 53	1.2078 969	4.3767 768	3.6234 69
¼	....	....	....	....	....	....	1.2222 407	4.6787 505	3.8280 11
½	....	....	....	1.2352 226	4.9520 550	4.0090 38	1.2367 548	4.9843 107	4.0301 53
¾	....	....	....	....	....	....	1.2514 412	5.2934 994	4.2299 23
5	1.2611 599	5.4981 035	4.3595 61	1.2645 591	5.5696 663	4.4044 33	1.2663 021	5.6063 597	4.4273 48
¼	....	....	....	....	....	....	1.2813 394	5.9229 352	4.6224 56
½	....	....	....	1.2945 924	6.2019 458	4.7906 55	1.2965 553	6.2432 701	4.8152 75
¾	....	....	....	....	....	....	1.3119 519	6.5674 089	5.0058 31
6	1.3210 650	6.7592 634	5.1165 26	1.3253 390	6.8492 421	5.1679 17	1.3275 314	6.8953 969	5.1941 50
¼	....	....	....	....	....	....	1.3432 958	7.2272 797	5.3802 59
½	....	....	....	1.3568 158	7.5119 116	5.5364 27	1.3592 474	7.5631 037	5.5641 85
¾	....	....	....	....	....	....	1.3753 885	7.9029 155	5.7459 52
7	1.3838 156	8.0803 284	5.8391 65	1.3890 402	8.1903 195	5.8963 88	1.3917 212	8.2467 626	5.9255 85
¼	....	....	....	....	....	....	1.4082 479	8.5946 929	6.1031 11
½	....	....	....	1.4220 299	8.8848 395	6.2479 98	1.4249 709	8.9467 549	6.2785 53
¾	....	....	....	....	....	....	1.4418 924	9.3029 976	6.4519 36
8	1.4495 468	9.4641 440	6.5290 36	1.4558 031	9.5958 545	6.5914 51	1.4590 149	9.6634 707	6.6232 85
¼	....	....	....	....	....	....	1.4763 407	10.028 224	6.7926 22
½	....	....	....	1.4903 784	10.323 756	6.9269 36	1.4938 722	10.397 310	6.9599 73
¾	....	....	....	....	....	....	1.5116 119	10.770 778	7.1253 59
9	1.5184 003	10.913 691	7.1876 24	1.5257 749	11.068 945	7.2546 38	1.5295 623	11.148 681	7.2888 04
¼	....	....	....	....	....	....	1.5477 259	11.531 071	7.4503 32
½	....	....	....	1.5620 121	11.831 833	7.5747 38	1.5661 051	11.918 003	7.6099 63
¾	....	....	....	....	....	....	1.5847 026	12.309 529	7.7677 22
10	1.5905 243	12.432 091	7.8163 48	1.5991 098	12.612 839	7.8874 12	1.6035 210	12.705 705	7.9236 29
¼	....	....	....	....	....	....	1.6225 628	13.106 585	8.0777 06
½	....	....	....	1.6370 887	13.412 394	8.1928 32	1.6418 307	13.512 226	8.2299 75
¾	....	....	....	....	....	....	1.6613 275	13.922 683	8.3804 57
11	1.6660 742	14.022 615	8.4165 61	1.6759 696	14.230 938	8.4911 67	1.6810 557	14.338 015	8.5291 73
¼	....	....	....	....	....	....	1.7010 183	14.758 279	8.6761 44
½	....	....	....	1.7157 738	15.068 923	8.7825 81	1.7212 178	15.183 534	8.8213 90
¾	....	....	....	....	....	....	1.7416 573	15.613 838	8.9649 31
12	1.7452 128	15.688 690	8.9895 57	1.7565 235	15.926 810	9.0672 34	1.7623 395	16.049 252	9.1067 88
¼	....	....	....	....	....	....	1.7832 673	16.489 837	9.2469 80
½	....	....	....	1.7982 409	16.805 071	9.3452 84	1.8044 436	16.935 654	9.3855 27
¾	....	....	....	....	....	....	1.8258 713	17.386 765	9.5224 48
13	1.8281 104	17.433 902	9.5365 70	1.8409 491	17.704 192	9.6168 83	1.8475 536	17.843 233	9.6577 62
¼	....	....	....	....	....	....	1.8694 933	18.305 121	9.7914 88
½	....	....	....	1.8846 717	18.624 666	9.8821 81	1.8916 935	18.772 495	9.9236 45
¾	....	....	....	....	....	....	1.9141 574	19.245 418	10.054 25
14	1.9149 456	19.262 013	10.058 78	1.9294 326	19.567 002	10.141 32	1.9368 880	19.723 957	10.183 32
¼	....	....	....	....	....	....	1.9598 885	20.208 179	10.310 88
½	....	....	....	1.9752 566	20.531 719	10.394 46	1.9831 622	20.698 151	10.436 94
¾	....	....	....	....	....	....	2.0067 122	21.193 942	10.561 53
15	2.0059 055	21.176 958	10.557 31	2.0221 690	21.519 347	10.641 72	2.0305 419	21.695 620	10.684 65
¼	....	....	....	....	....	....	2.0546 546	22.203 255	10.806 32
½	....	....	....	2.0701 955	22.530 431	10.883 24	2.0790 537	22.716 919	10.926 57
¾	....	....	....	....	....	....	2.1037 424	23.236 683	11.043 40
16	2.1011 860	23.182 864	11.033 23	2.1193 626	23.565 589	11.119 16	2.1287 244	23.762 618	11.162 84
17	2.2009 924	25.284 050	11.487 57	2.2212 278	25.710 059	11.574 71	2.2316 542	25.929 561	11.618 99
18	2.3055 395	27.485 042	11.921 31	2.3279 890	27.957 664	12.009 36	2.3395 609	28.201 283	12.054 09
19	2.4150 526	29.790 582	12.335 38	2.4398 817	30.313 298	12.424 09	2.4526 853	30.582 848	12.469 13
20	2.5297 676	32.205 635	12.730 67	2.5571 523	32.782 153	12.819 79	2.5712 795	33.079 568	12.865 02
21	2.6499 316	34.736 402	13.108 04	2.6800 594	35.369 672	13.197 35	2.6956 081	35.697 013	13.242 66
22	2.7758 034	37.385 334	13.468 29	2.8088 739	38.081 557	13.557 59	2.8259 483	38.441 017	13.602 88
23	2.9076 540	40.161 137	13.812 21	2.9438 798	40.923 786	13.901 31	2.9625 909	41.317 703	13.946 48
24	3.0457 676	43.068 791	14.140 54	3.0853 747	43.902 624	14.239 27	3.1058 405	44.333 484	14.274 23
25	3.1914 415	46.114 559	14.453 97	3.2336 703	47.024 638	14.548 19	3.2560 166	47.495 086	14.586 87

PERPETUAL STOCK: 3 p.C. 63,1579; 3½ p.C.73,6842; 4 p.C. 84,2105; 5 p.C. 105,2

Years.	RATIO of INTEREST: *ANNUALLY*, 0.0475.			RATIO of INTEREST: *HALF-YEARLY*, 0.02375.			RATIO of INTEREST: *QUARTERLY*, 0.011875.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio o Annuity
0¼	....	....	....	....	....	....	0.9882 644	4.0000 000	4.0475 00
½	....	....	....	0.9768 009	2.0000 000	2.0475 000	0.9766 665	1.9881 951	2.0356 9
¾	....	....	....	....	....	....	0.9652 047	1.3176 247	1.3651 2
1	0.9546 540	1.0000 000	1.0475 000	0.9541 401	0.9882 644	1.0357 644	0.9538 774	0.9823 627	1.0298 6
¼	....	....	....	....	....	....	0.9426 830	0.7812 243	0.8287 24
½	....	....	....	0.9320 060	0.6510 811	0.6985 811	0.9316 200	0.6471 476	0.6946 47
¾	....	....	....	....	....	....	0.9206 869	0.5513 918	0.5988 91
2	0.9113 641	0.4884 005	0.5359 005	0.9103 834	0.4825 359	0.5300 359	0.9098 820	0.4795 867	0.5270 8
¼	....	....	....	....	....	....	0.8992 039	0.4237 486	0.4712 48
½	....	....	....	0.8892 634	0.3814 459	0.4289 459	0.8886 512	0.3790 875	0.4265 87
¾	....	....	....	....	....	....	0.8782 223	0.3425 551	0.3900 55
3	0.8700 374	0.3179 897	0.3654 897	0.8686 334	0.3140 835	0.3615 835	0.8679 158	0.3121 191	0.3596 19
¼	....	....	....	....	....	....	0.8577 303	0.2863 729	0.3338 72
½	....	....	....	0.8484 819	0.2659 940	0.3134 940	0.8476 643	0.2643 113	0.3118 11
¾	....	....	....	....	....	....	0.8377 163	0.2451 974	0.2926 97
4	0.8305 846	0.2328 759	0.2803 759	0.8287 980	0.2299 500	0.2774 500	0.8278 853	0.2284 787	0 2759 78
¼	....	....	....	....	....	....	0.8181 694	0.2137 323	0.2612 32
½	....	....	....	0.8095 707	0.2019 368	0.2494 368	0.8085 677	0.2006 295	0.2481 29
¾	....	....	....	....	....	....	0.7990 787	0.1889 110	0.2364 11
5	0.7929 207	0.1818 809	0.2293 809	0.7907 894	0.1795 440	0.2270 440	0.7897 011	0.1783 689	0.2258 68
¼	....	....	....	....	....	....	0.7804 333	0.1688 352	0.2163 35
½	....	....	....	0.7724 438	0.1612 397	0.2087 397	0.7712 744	0.1601 725	0.2076 72
¾	....	....	....	....	....	....	0.7622 231	0.1522 671	0.1997 67
6	0.7569 650	0.1479 451	0.1954 451	0.7545 239	0.1460 016	0.1935 016	0.7532 779	0.1450 243	0.1925 24
¼	....	....	....	....	....	....	0.7444 377	0.1383 646	0.1858 64
½	....	....	....	0.7370 197	0.1331 219	0.1806 219	0.7357 012	0.1322 209	0.1797 20
¾	....	....	....	....	....	....	0.7270 673	0.1265 356	0.1740 35
7	0.7226 396	0.1237 574	0.1712 574	0.7199 216	0.1220 954	0.1695 954	0.7185 347	0.1212 597	0.1687 59
¼	....	....	....	....	....	....	0.7101 023	0.1163 509	0.1638 50
½	....	....	....	0.7032 201	0.1125 513	0.1600 513	0.7017 687	0.1117 724	0.1592 72
¾	....	....	....	....	....	....	0.6935 330	0.1074 922	0.1549 92
8	0.6898 708	0.1056 620	0.1531 620	0.6869 061	0.1042 117	0.1517 117	0.6853 940	0.1034 825	0.1509 82
¼	....	....	....	....	....	....	0.6773 505	0.0997 185	0.1472 18
½	....	....	....	0.6709 705	0.0968 640	0.1443 640	0.6694 013	0.0961 787	0.1436 78
¾	....	....	....	....	....	....	0.6615 454	0.0928 434	0.1403 43
9	0.6585 879	0.0916 280	0.1391 280	0.6554 047	0.0903 428	0.1378 428	0.6537 818	0.0896 967	0.1371 96
¼	....	....	....	....	....	....	0.6461 092	0.0867 222	0.1342 22
½	....	....	....	0.6401 999	0.0845 178	0.1320 178	0.6385 267	0.0839 067	0.1314 06
¾	....	....	....	....	....	....	0.6310 332	0.0812 379	0.1287 37
10	0.6287 235	0.0804 370	0.1279 370	0.6253 478	0.0792 843	0.1267 843	0.6236 276	0.0787 048	0.1262 04
¼	....	....	....	....	....	....	0.6163 090	0.0762 975	0.1237
½	....	....	....	0.6108 404	0.0745 579	0.1220 579	0.6090 762	0.0740 071	0.1215
¾	....	....	....	....	....	....	0.6019 283	0 0718 252	0.1193
11	0.6002 133	0.0713 134	0.1188 134	0.5966 696	0.0702 694	0.1177 694	0.5948 642	0.0697 447	0.1172
¼	....	....	....	....	....	....	0.5878 832	0.0677 586	0.1152
½	....	....	....	0.5828 274	0.0663 617	0.1138 617	0.5809 840	0.0658 608	0.1133
¾	....	....	....	....	....	....	0.5741 658	0.0640 458	0.1115
12	0.5729 960	0.0637 402	0.1112 402	0.5693 064	0.0627 872	0.1102 872	0.5674 276	0.0623 082	0.1098
¼	....	....	....	....	....	....	0.5607 684	0.0606 434	0.1081
½	....	....	....	0.5560 990	0.0595 058	0.1070 058	0.5541 875	0.0590 470	0.1065
¾	....	....	....	....	....	....	0.5476 837	0.0575 150	0.1050
13	0.5470 128	0.0573 595	0.1048 595	0.5431 981	0.0564 838	0.1039 838	0.5412 563	0.0560 438	0.1035
¼	....	....	....	....	....	....	0.5349 043	0.0546 295	0.1021
½	....	....	....	0.5305 964	0.0536 922	0.1011 922	0.5286 269	0.0532 694	0.1007
¾	....	....	....	....	....	....	0.5224 230	0.0519 604	0.0994
14	0.5222 081	0.0519 157	0.0994 157	0.5182 871	0.0511 065	0.0986 065	0.5162 921	0.0506 998	0.0981
¼	....	....	....	....	....	....	0.5102 331	0.0494 849	0.0969
½	....	....	....	0.5062 633	0.0487 051	0.0962 051	0.5042 452	0.0483 135	0.0958
¾	....	....	....	....	....	....	0.4983 276	0.0471 833	0.0946
15	0.4985 280	0.0472 211	0.0947 211	0.4945 185	0.0464 698	0.0939 698	0.4924 793	0.0460 923	0.0935
¼	....	....	....	....	....	....	0.4866 999	0.0450 384	0.0925
½	....	....	....	0.4830 461	0.0443 844	0.0918 844	0.4809 881	0.0440 201	0.0915
¾	....	....	....	....	....	....	0.4753 433	0.0430 354	0.0905
16	0.4759 217	0.0431 353	0.0906 353	0.4718 399	0.0424 349	0.0899 349	0.4697 649	0.0420 829	0.0895
17	0.4543 405	0.0395 506	0.0870 506	0.4502 015	0.0388 953	0.0863 953	0.4480 981	0.0385 660	0.0860
18	0.4337 380	0.0363 834	0.0838 834	0.4295 553	0.0357 684	0.0832 684	0.4274 306	0.0354 594	0.0829
19	0.4140 696	0.0335 677	0.0810 677	0.4098 560	0.0329 888	0.0804 888	0.4077 164	0.0326 981	0.0801
20	0.3952 932	0.0310 505	0.0785 505	0.3910 600	0.0305 044	0.0780 044	0.3889 115	0.0302 301	0.0777
21	0.3773 682	0.0287 891	0.0762 891	0.3731 261	0.0282 598	0.0757 598	0.3709 738	0.0280 135	0.0755
22	0.3602 561	0.0267 485	0.0742 485	0.3560 145	0.0262 594	0.0737 594	0.3538 635	0.0260 139	0.0735
23	0.3439 199	0.0248 997	0.0723 997	0.3396 878	0.0244 357	0.0719 357	0.3375 424	0.0242 027	0.0717
24	0.3283 245	0.0232 187	0.0707 187	0.3241 098	0.0227 777	0.0702 777	0.3219 741	0.0225 563	0.0700
25	0.3134 362	0.0216 851	0.0691 851	0.3092 461	0.0212 654	0.0687 654	0.3071 237	0.0210 548	0.0685

RATE of INTEREST. 4¾ *per Cent. per Ann.*——CORRESPONDING VALUE of

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0475.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02375.			RATIO *of* INTEREST: *QUARTERLY*, 0.011875.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	3.3419 875	49.305 000	14.753 20	3.3890 936	50.296 708	14.840 75	3.4134 542	50.809 561	14.885 09
27	3.5007 319	52.646 988	15.038 85	3.5519 872	53.726 047	15.125 63	3.5785 043	54.284 300	15.169 55
28	3.6670 167	56.147 720	15.311 55	3.7227 102	57.320 214	15.397 45	3.7515 350	57.927 053	15.440 89
29	3.8412 000	59.814 736	15.571 89	3.9016 388	61.087 132	15.656 79	3.9329 323	61.746 943	15.699 72
30	4.0236 570	63.655 936	15.820 42	4.0891 674	65.035 102	15.904 24	4.1231 006	65.749 486	15.946 61
31	4.2147 807	67.679 593	16.057 68	4.2857 094	69.172 829	16.140 35	4.3224 641	69.946 613	16.182 12
32	4.4149 828	71.894 374	16.284 18	4.4916 980	73.509 431	16.365 62	4.5314 674	74.346 682	16.405 76
33	4.6246 944	76.309 357	16.500 41	4.7075 872	78.054 468	16.580 57	4.7505 766	78.959 507	16.621 04
34	4.8443 674	80.934 051	16.703 84	4.9338 530	82.817 996	16.785 66	4.9802 803	83.795 375	16.825 43
35	5.0744 749	85.778 419	16.903 90	5.1709 940	87.810 400	16.981 34	5.2210 909	88.865 071	17.020 40
36	5.3155 124	90.852 894	17.092 03	5.4195 330	93.042 800	17.168 05	5.4735 453	94.179 901	17.206 38
37	5.5679 993	96.168 406	17.271 62	5.6800 177	98.526 689	17.346 19	5.7382 066	99.751 718	17.383 78
38	5.8324 792	101.73 641	17.443 08	5.9530 225	104.27 416	17.516 17	6.0156 650	105.59 295	17.553 00
39	6.1095 220	107.56 888	17.606 76	6.2391 489	110.29 787	17.678 35	6.3065 394	111.71 662	17.714 41
40	6.3997 243	113.67 841	17.763 02	6.5390 278	116.61 111	17.833 10	6.6114 783	118.13 638	17.868 38
41	6.7037 112	120.07 813	17.912 19	6.8533 200	123.22 779	17.980 74	6.9311 618	124.86 657	18.015 24
42	7.0221 375	126.78 184	18.054 59	7.1827 184	130.16 249	18.121 62	7.2663 030	131.92 217	18.155 33
43	7.3556 890	133.80 398	18.190 54	7.5279 490	137.43 051	18.256 03	7.6176 492	139.31 893	18.288 96
44	7.7050 843	141.15 967	18.320 33	7.8897 728	145.04 785	18.384 29	7.9859 840	147.07 335	18.416 43
45	8.0710 758	148.86 475	18.444 23	8.2689 874	153.03 131	18.506 66	8.3721 287	155.20 271	18.538 02
46	8.4544 519	156.93 583	18.562 51	8.6664 285	161.39 849	18.623 41	8.7769 447	163.72 515	18.654 00
47	8.8560 383	165.39 028	18.675 42	9.0829 723	170.16 784	18.734 82	9.2013 347	172.65 968	18.764 63
48	9.2767 001	174.24 632	18.783 22	9.5195 368	179.35 867	18.841 11	9.6462 451	182.02 621	18.870 16
49	9.7173 434	183.52 302	18.886 13	9.9770 844	188.99 125	18.942 53	10.112 668	191.84 564	18.970 82
50	10.178 917	193.24 036	18.984 37	10.456 624	199.08 681	19.039 30	10.601 644	202.13 988	19.066 84
51	10.662 416	203.41 928	19.078 16	10.959 211	209.66 761	19.131 63	11.114 263	212.93 186	19.158 43
52	11.168 881	214.08 170	19.167 69	11.485 956	220.75 696	19.219 73	11.651 669	224.24 567	19.245 80
53	11.699 402	225.25 058	19.253 17	12.038 017	232.37 931	19.303 79	12.215 060	236.10 653	19.329 13
54	12.255 124	236.94 998	19.334 77	12.616 613	244.56 028	19.383 99	12.805 693	248.54 090	19.408 62
55	12.837 242	249.20 510	19.412 67	13.223 019	257.32 672	19.460 51	13.424 884	261.57 651	19.484 45
56	13.447 011	262.04 234	19.487 04	13.858 571	270.70 676	19.533 53	14.074 015	275.24 242	19.556 78
57	14.085 744	275.48 936	19.558 03	14.524 670	284.72 990	19.603 19	14.754 533	289.56 912	19.625 77
58	14.754 817	289.57 510	19.625 80	15.222 785	299.42 705	19.669 66	15.467 956	304.58 855	19.691 58
59	15.455 671	304.32 992	19.690 50	15.954 454	314.83 061	19.733 09	16.215 875	320.33 422	19.754 36
60	16.189 815	319.78 559	19.752 27	16.721 290	330.97 452	19.793 60	16.999 959	336.84 123	19.814 24
61	16.958 832	335.97 540	19.811 23	17.524 983	347.89 438	19.851 34	17.821 954	354.14 641	19.871 35
62	17.764 376	352.93 424	19.867 53	18.367 305	365.62 747	19.906 43	18.683 696	372.28 834	19.925 84
63	18.608 184	370.69 861	19.921 27	19.250 112	384.21 288	19.959 00	19.587 105	391.30 748	19.977 81
64	19.492 073	389.30 680	19.972 57	20.175 351	403.69 159	20.009 15	20.534 197	411.24 625	20.027 38
65	20.417 946	408.79 887	20.021 55	21.145 060	424.10 652	20.057 00	21.527 083	432.14 912	20.074 67
66	21.387 799	429.21 681	20.068 30	22.161 377	445.50 268	20.102 66	22.567 978	454.06 269	20.119 78
67	22.403 719	450.60 461	20.112 94	23.226 543	467.92 723	20.146 23	23.659 203	477.03 986	20.162 80
68	23.467 896	473.00 833	20.155 55	24.342 905	491.42 958	20.187 80	24.803 192	501.11 984	20.203 84
69	24.582 621	496.47 623	20.196 23	25 512 924	516.06 156	20.227 46	26.002 496	526.36 834	20.242 99
70	25.750 295	521.05 885	20.235 06	26.739 179	541.87 745	20.265 30	27.259 790	552.83 769	20.280 33
71	26.973 434	546.80 914	20.272 14	28.024 373	568.93 416	20.301 41	28.577 878	580.58 689	20.315 95
72	28.254 673	573.78 258	20.307 53	29.371 338	597.29 132	20.335 86	29.959 698	609.67 786	20.349 93
73	29.596 769	602.03 725	20.341 32	30.783 044	627.01 144	20.368 72	31.408 334	640.17 545	20.382 34
74	31.002 616	631.63 402	20.373 57	32.262 602	658.16 003	20.400 09	32.927 015	672.14 769	20.413 26
75	32.475 240	662.63 664	20.404 36	33.813 273	690.80 575	20.430 02	34.519 129	705.66 587	20.442 75
76	34.017 814	695.11 188	20.433 76	35.438 477	725.02 056	20.458 57	36.188 226	740.80 476	20.470 87
77	35.633 660	729.12 969	20.461 82	37.141 794	760.87 987	20.485 81	37.938 028	777.64 270	20.497 70
78	37.326 259	764.76 335	20 488 61	38.926 979	798.46 272	20.511 81	39.772 439	816.26 187	20.523 30
79	39.099 257	802.08 961	20.514 18	40.797 968	837.85 196	20.536 61	41.695 548	856.74 838	20.547 71
80	40.956 471	841.18 887	20.538 60	42.758 884	879.13 440	20.560 28	43.711 645	899.19 253	20.571 01
81	42.901 904	882.14 534	20.561 91	44 814 050	922.40 105	20.582 85	45.825 226	943.68 897	20.593 22
82	44.939 744	925.04 724	20.584 16	46.967 995	967.74 727	20.604 40	48.041 005	990.33 694	20.614 40
83	47.074 382	969.98 699	20.605 40	49.225 468	1015.2 730	20.624 95	50.363 922	1039.2 405	20.634 62
84	49.310 415	1017.0 614	20.625 68	51.591 444	1065.0 830	20.644 57	52.799 159	1090.5 086	20.653 90
85	51.652 660	1066.3 718	20.646 04	54.071 138	1117.2 871	20.663 28	55.352 147	1144.2 557	20.672 29
86	54.106 161	1118.0 244	20.663 53	56.670 017	1172.0 004	20.681 14	58.028 579	1200.6 017	20.689 83
87	56.676 204	1172.1 306	20.681 17	59.393 808	1229.3 433	20.698 17	60.834 424	1259.6 721	20.706 56
88	59.368 323	1228.8 068	20.698 01	62 248 516	1289.4 424	20.714 43	63.775 940	1321.5 987	20.722 52
89	62.188 319	1288.1 751	20.714 10	65.240 432	1352.4 301	20.729 94	66.859 686	1386.5 197	20.737 75
90	65.142 264	1350.3 635	20.729 44	68.376 152	1418.4 453	20.744 73	70.092 540	1454.5 798	20.752 26
91	68.236 521	1415.5 057	20.744 10	71.662 588	1487.6 334	20.758 86	73.481 711	1525.9 308	20.766 13
92	71.477 756	1483.7 422	20.758 09	75.106 983	1560.1 470	20.772 33	77.034 758	1600.7 318	20.779 34
93	74.872 950	1555.2 200	20.771 45	78.716 930	1636.1 459	20.785 19	80.759 605	1679.1 496	20.791 95
94	78.429 415	1630.0 929	20.784 20	82.500 385	1715.7 976	20.797 45	84.664 559	1761.3 591	20.803 97
95	82.154 812	1708.5 224	20.796 37	86.465 689	1799.2 777	20.809 15	88.758 329	1847.5 438	20.815 44
96	86.057 165	1790.6 772	20.807 99	90.621 582	1886.7 701	20.820 32	93.050 044	1937.8 957	20.826 38
97	90.144 881	1876.7 343	20.819 08	94.977 223	1978.4 678	20.830 97	97.549 275	2032.6 163	20.836 81
98	94.426 763	1966.8 792	20.829 68	99.542 214	2074.5 729	20.841 14	102.26 606	2131.9 170	20.846 76
99	98.912 034	2061.3 060	20.839 78	104.32 662	2175.2 972	20.850 84	107.21 091	2236.0 191	20.856 26
100	103.61 036	2160.2 180	20.849 43	109.34 098	2280.8 627	20.860 09	112.39 486	2345.1 549	20.865 32
	Value of Perpetual Ann.		21.052 63	- - - - - - - - - -		21.052 63	- - - - - - - - - -		21.052 63

PERPETUAL STOCK: 3 *p.C.* 63,1579; 3½ *p.C.* 73,6842; 4 *p.C.* 84,2105; 5 *p.C.* 105,263

Years.	RATIO *of* INTEREST: *ANNUALLY,* 0.0475.			RATIO *of* INTEREST: *HALF-YEARLY,* 0.02375.			RATIO *of* INTEREST: *QUARTERLY,* 0.011875.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.2992 231	0.0202 819	0.0677 819	0.2950 641	0.0198 820	0.0673 820	0.2929 584	0.0196 813	0.0671 813
27	0.2856 546	0.0189 944	0.0664 944	0.2815 325	0.0186 129	0.0661 129	0.2794 464	0.0184 215	0.0659 215
28	0.2727 012	0.0178 101	0.0653 101	0.2686 215	0.0174 458	0.0649 458	0.2665 576	0.0172 631	0.0647 631
29	0.2603 352	0.0167 183	0.0642 183	0.2563 025	0.0163 701	0.0638 701	0.2542 632	0.0161 954	0.0636 954
30	0.2485 301	0.0157 095	0.0632 095	0.2445 486	0.0153 763	0.0628 763	0.2425 359	0.0152 092	0.0627 092
31	0.2372 603	0.0147 755	0.0622 755	0.2333 336	0.0144 565	0.0619 565	0.2313 495	0.0142 966	0.0617 966
32	0.2265 014	0.0139 093	0.0614 093	0.2226 329	0.0136 037	0.0611 037	0.2206 791	0.0134 505	0.0609 505
33	0.2162 305	0.0131 046	0.0606 046	0.2124 230	0.0128 116	0.0603 116	0.2105 008	0.0126 647	0.0601 647
34	0.2064 253	0.0123 557	0.0598 557	0.2026 814	0.0120 747	0.0595 747	0.2007 919	0.0119 338	0.0594 338
35	0.1970 647	0.0116 579	0.0591 579	0.1933 864	0.0113 882	0.0588 882	0.1915 309	0.0112 530	0.0587 530
36	0.1881 286	0.0110 068	0.0585 068	0.1845 177	0.0107 477	0.0582 477	0.1826 969	0.0106 180	0.0581 180
37	0.1795 977	0.0103 984	0.0578 984	0.1760 558	0.0101 495	0.0576 495	0.1742 705	0.0100 249	0.0575 249
38	0.1714 537	0.0098 293	0.0573 293	0.1679 819	0.0095 901	0.0570 901	0.1662 327	0.0094 703	0.0569 703
39	0.1636 789	0.0092 964	0.0567 964	0.1602 783	0.0090 664	0.0565 664	0.1585 656	0.0089 512	0.0564 512
40	0.1562 567	0.0087 967	0.0562 967	0.1529 279	0.0085 755	0.0560 755	0.1512 521	0.0084 648	0.0559 648
41	0.1491 711	0.0083 279	0.0558 279	0.1459 147	0.0081 150	0.0556 150	0.1442 760	0.0080 085	0.0555 085
42	0.1424 068	0.0078 876	0.0553 876	0.1392 231	0.0076 827	0.0551 827	0.1376 216	0.0075 802	0.0550 802
43	0.1359 492	0.0074 736	0.0549 736	0.1328 383	0.0072 764	0.0547 764	0.1312 741	0.0071 778	0.0546 778
44	0.1297 844	0.0070 842	0.0545 842	0.1267 464	0.0068 943	0.0543 943	0.1252 194	0.0067 993	0.0542 993
45	0.1238 992	0.0067 175	0.0542 175	0.1209 338	0.0065 346	0.0540 346	0.1194 439	0.0064 432	0.0539 432
46	0.1182 809	0.0063 720	0.0538 720	0.1153 878	0.0061 958	0.0536 958	0.1139 348	0.0061 078	0.0536 078
47	0.1129 173	0.0060 463	0.0535 463	0.1100 961	0.0058 766	0.0533 766	0.1086 799	0.0057 917	0.0532 917
48	0.1077 970	0.0057 390	0.0532 390	0.1050 471	0.0055 754	0.0530 754	0.1036 673	0.0054 937	0.0529 937
49	0.1029 088	0.0054 489	0.0529 489	0.1002 297	0.0052 912	0.0527 912	0.0988 859	0.0052 125	0.0527 125
50	0.0982 423	0.0051 749	0.0526 749	0.0956 332	0.0050 229	0.0525 229	0.0943 250	0.0049 471	0.0524 471
51	0.0937 874	0.0049 160	0.0524 160	0.0912 474	0.0047 695	0.0522 695	0.0899 745	0.0046 963	0.0521 963
52	0.0895 345	0.0046 711	0.0521 711	0.0870 628	0.0045 299	0.0520 299	0.0858 246	0.0044 594	0.0519 594
53	0.0854 745	0.0044 395	0.0519 395	0.0830 702	0.0043 033	0.0518 033	0.0818 661	0.0042 354	0.0517 354
54	0.0815 986	0.0042 203	0.0517 203	0.0792 606	0.0040 890	0.0515 890	0.0780 903	0.0040 235	0.0515 235
55	0.0778 984	0.0040 128	0.0515 128	0.0756 257	0.0038 861	0.0513 861	0.0744 885	0.0038 230	0.0513 230
56	0.0743 660	0.0038 162	0.0513 162	0.0721 575	0.0036 940	0.0511 940	0.0710 529	0.0036 332	0.0511 332
57	0.0709 938	0.0036 299	0.0511 299	0.0688 484	0.0035 121	0.0510 121	0.0677 758	0.0034 534	0.0509 534
58	0.0677 745	0.0034 533	0.0509 533	0.0656 910	0.0033 397	0.0508 397	0.0646 498	0.0032 831	0.0507 831
59	0.0647 012	0.0032 859	0.0507 859	0.0626 784	0.0031 763	0.0506 763	0.0616 680	0.0031 217	0.0506 217
60	0.0617 672	0.0031 271	0.0506 271	0.0598 040	0.0030 214	0.0505 214	0.0588 237	0.0029 688	0.0504 688
61	0.0589 663	0.0029 764	0.0504 764	0.0570 614	0.0028 744	0.0503 744	0.0561 106	0.0028 237	0.0503 237
62	0.0562 924	0.0028 334	0.0503 334	0.0544 446	0.0027 350	0.0502 350	0.0535 226	0.0026 861	0.0501 861
63	0.0537 398	0.0026 977	0.0501 977	0.0519 478	0.0026 027	0.0501 027	0.0510 540	0.0025 555	0.0500 555
64	0.0513 029	0.0025 687	0.0500 687	0.0495 654	0.0024 771	0.0499 771	0.0486 992	0.0024 316	0.0499 316
65	0.0489 765	0.0024 462	0.0499 462	0.0472 924	0.0023 579	0.0498 579	0.0464 531	0.0023 140	0.0498 140
66	0.0467 556	0.0023 298	0.0498 298	0.0451 235	0.0022 447	0.0497 447	0.0443 106	0.0022 023	0.0497 023
67	0.0446 354	0.0022 192	0.0497 192	0.0430 542	0.0021 371	0.0496 371	0.0422 669	0.0020 963	0.0495 963
68	0.0426 114	0.0021 141	0.0496 141	0.0410 797	0.0020 349	0.0495 349	0.0403 174	0.0019 955	0.0494 955
69	0.0406 791	0.0020 142	0.0495 142	0.0391 958	0.0019 378	0.0494 378	0.0384 578	0.0018 998	0.0493 998
70	0.0388 345	0.0019 192	0.0494 192	0.0373 983	0.0018 454	0.0493 454	0.0366 841	0.0018 088	0.0493 088
71	0.0370 735	0.0018 288	0.0493 288	0.0356 832	0.0017 577	0.0492 577	0.0349 921	0.0017 224	0.0492 224
72	0.0353 924	0.0017 428	0.0492 428	0.0340 468	0.0016 742	0.0491 742	0.0333 782	0.0016 402	0.0491 402
73	0.0337 875	0.0016 610	0.0491 610	0.0324 854	0.0015 949	0.0490 949	0.0318 387	0.0015 621	0.0490 621
74	0.0322 553	0.0015 832	0.0490 832	0.0309 956	0.0015 194	0.0490 194	0.0303 702	0.0014 878	0.0489 878
75	0.0307 927	0.0015 091	0.0490 091	0.0295 742	0.0014 476	0.0489 476	0.0289 694	0.0014 171	0.0489 171
76	0.0293 964	0.0014 386	0.0489 386	0.0282 179	0.0013 793	0.0488 793	0.0276 333	0.0013 499	0.0488 499
77	0.0280 634	0.0013 715	0.0488 715	0.0269 238	0.0013 143	0.0488 143	0.0263 588	0.0012 859	0.0487 859
78	0.0267 908	0.0013 076	0.0488 076	0.0256 891	0.0012 524	0.0487 524	0.0251 430	0.0012 251	0.0487 251
79	0.0255 759	0.0012 467	0.0487 467	0.0245 110	0.0011 935	0.0486 935	0.0239 834	0.0011 672	0.0486 672
80	0.0244 162	0.0011 888	0.0486 888	0.0233 870	0.0011 375	0.0486 375	0.0228 772	0.0011 121	0.0486 121
81	0.0233 090	0.0011 336	0.0486 336	0.0223 144	0.0010 841	0.0485 841	0.0218 220	0.0010 597	0.0485 597
82	0.0222 520	0.0010 810	0.0485 810	0.0212 911	0.0010 333	0.0485 333	0.0208 155	0.0010 098	0.0485 098
83	0.0212 430	0.0010 309	0.0485 309	0.0203 147	0.0009 850	0.0484 850	0.0198 555	0.0009 622	0.0484 622
84	0.0202 797	0.0009 832	0.0484 832	0.0193 831	0.0009 389	0.0484 389	0.0189 397	0.0009 170	0.0484 170
85	0.0193 601	0.0009 378	0.0484 378	0.0184 942	0.0008 950	0.0483 950	0.0180 661	0.0008 739	0.0483 739
86	0.0184 822	0.0008 944	0.0483 944	0.0176 460	0.0008 532	0.0483 532	0.0172 329	0.0008 329	0.0483 329
87	0.0176 441	0.0008 531	0.0483 531	0.0168 368	0.0008 134	0.0483 134	0.0164 381	0.0007 939	0.0482 939
88	0.0168 440	0.0008 138	0.0483 138	0.0160 646	0.0007 755	0.0482 755	0.0156 799	0.0007 567	0.0482 567
89	0.0160 802	0.0007 763	0.0482 763	0.0153 279	0.0007 394	0.0482 394	0.0149 567	0.0007 212	0.0482 212
90	0.0153 510	0.0007 405	0.0482 405	0.0146 250	0.0007 050	0.0482 050	0.0142 669	0.0006 875	0.0481 875
91	0.0146 549	0.0007 065	0.0482 065	0.0139 543	0.0006 722	0.0481 722	0.0136 088	0.0006 553	0.0481 553
92	0.0139 904	0.0006 740	0.0481 740	0.0133 143	0.0006 410	0.0481 410	0.0129 812	0.0006 247	0.0481 247
93	0.0133 560	0.0006 430	0.0481 430	0.0127 037	0.0006 112	0.0481 112	0.0123 824	0.0005 955	0.0480 955
94	0.0127 503	0.0006 135	0.0481 135	0.0121 212	0.0005 828	0.0480 828	0.0118 113	0.0005 677	0.0480 677
95	0.0121 721	0.0005 853	0.0480 853	0.0115 653	0.0005 558	0.0480 558	0.0112 665	0.0005 413	0.0480 413
96	0.0116 202	0.0005 584	0.0480 584	0.0110 349	0.0005 300	0.0480 300	0.0107 469	0.0005 160	0.0480 160
97	0.0110 933	0.0005 328	0.0480 328	0.0105 288	0.0005 054	0.0480 054	0.0102 512	0.0004 920	0.0479 920
98	0.0105 902	0.0005 084	0.0480 084	0.0100 460	0.0004 820	0.0479 820	0.0097 784	0.0004 691	0.0479 691
99	0.0101 100	0.0004 851	0.0479 851	0.0095 853	0.0004 597	0.0479 597	0.0093 274	0.0004 472	0.0479 472
100	0.0096 515	0.0004 629	0.0479 629	0.0091 457	0.0004 384	0.0479 384	0.0088 972	0.0004 264	0.0479 264
	Ratio of Perpetual Ann.		0.0475 000	- - - - - - - - - -		0.0475 000	- - - - - - - - - -		0.0475 000

RATE OF INTEREST: *5 per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.05.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.025.			RATIO *of* INTEREST: *QUARTERLY*, 0.0125.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
¼	....	....	....	....	....	....	1.0125 000	0.2500 000	0.2469 14
½	....	....	....	1.0250 000	0.5000 000	0.4878 05	1.0251 563	0.5031 250	0.4907 79
¾	....	....	....	....	....	....	1.0379 707	0.7594 141	0.7316 33
1	1.0500 000	1.0000 000	0.9523 81	1.0506 250	1.0125 000	0.9637 12	1.0509 453	1.0189 007	0.9695 14
¼	....	....	....	....	....	....	1.0640 822	1.2816 431	1.2044 59
½	....	....	....	1.0768 906	1.5378 125	1.4280 12	1.0773 832	1.5476 636	1.4365 02
¾	....	....	....	....	....	....	1.0908 505	1.8170 094	1.6656 81
2	1.1025 000	2.0500 000	1.8594 10	1.1038 129	2.0762 578	1.8809 87	1.1044 861	2.0897 220	1.8920 31
¼	....	....	....	....	....	....	1.1182 922	2.3658 435	2.1155 86
½	....	....	....	1.1314 082	2.6281 643	2.8229 14	1.1322 708	2.6454 166	2.3363 81
¾	....	....	....	....	....	....	1.1464 242	2.9284 843	2 5544 51
3	1.1576 250	3.1525 000	2.7232 48	1.1596 934	3.1938 684	2.7540 63	1.1607 545	3.2150 904	2.7698 28
¼	....	....	....	....	....	....	1.1752 639	3.5052 790	2.9825 46
½	....	....	....	1.1886 858	3.7737 151	3.1746 95	1.1899 547	3.7990 950	3.1926 38
¾	....	....	....	....	....	....	1.2048 292	4.0965 837	3.4001 36
4	1.2155 063	4.3101 250	3.5459 51	1 2184 029	4.3680 580	3.5850 69	1.2198 895	4.3977 910	3.6050 73
¼	....	....	....	....	....	....	1.2351 382	4.7027 633	3.8074 80
½	....	....	....	1.2488 630	4.9772 594	3.9854 33	1.2505 774	5.0115 479	4.0073 87
¾	....	....	....	....	....	....	1.2662 096	5.3241 922	4.2048 27
5	1.2762 816	5.5256 313	4.3294 77	1.2800 845	5.6016 909	4.3760 32	1.2820 372	5.6407 446	4.3998 27
¼	....	....	....	....	....	....	1.2980 627	5.9612 539	4.5924 22
½	....	....	....	1.3120 867	6.2417 332	4.7571 04	1.3142 885	6.2857 696	4.7826 39
¾	....	....	....	....	....	....	1.3307 171	6.6143 417	4.9705 08
6	1.3400 956	6.8019 128	5.0756 92	1.3448 888	6.8977 765	5.1288 82	1.3473 511	6.9470 210	5.1560 57
¼	....	....	....	....	....	....	1.3641 929	7.2838 588	5.3393 15
½	....	....	....	1.3785 110	7.5702 209	5.4915 92	1.3812 454	7.6249 070	5.5903 11
¾	....	....	....	....	....	....	1.3985 109	7.9702 183	5.6990 73
7	1.4071 004	8.1420 085	5.7863 73	1.4129 738	8.2594 764	5.8454 56	1.4159 923	8.3198 461	5.8756 28
¼	....	....	....	....	....	....	1.4336 922	8.6738 441	6.0500 03
½	....	....	....	1.4482 982	8.9659 633	6.1906 89	1.4516 134	9.0322 672	6.2222 25
¾	....	....	....	....	....	....	1.4697 585	9.3951 705	6.3923 21
8	1.4774 554	9.5491 089	6.4632 13	1.4845 056	9.6901 124	6.5275 01	1.4881 305	9.7626 102	6.5603 17
¼	....	....	....	....	....	....	1.5067 321	10.134 643	6.7262 39
½	....	....	....	1.5216 183	10.432 365	6.8560 99	1.5255 663	10.511 326	6.8901 12
¾	....	....	....	....	....	....	1.5446 359	10.892 717	7.0519 63
9	1.5513 282	11.026 564	7.1078 22	1.5596 587	11.193 174	7.1766 82	1.5639 438	11.278 876	7.2118 15
¼	....	....	....	....	....	....	1.5834 931	11.669 862	7.3696 94
½	....	....	....	1.5986 502	11.973 004	7.4894 46	1.6032 868	12.065 736	7.5256 24
¾	....	....	....	....	....	....	1.6233 279	12.466 557	7.6796 28
10	1.6288 946	12.577 893	7.7217 35	1.6386 164	12.772 329	7.7945 81	1.6436 195	12.872 389	7.8317 32
¼	....	....	....	....	....	....	1.6641 647	13.283 294	7.9819 57
½	....	....	....	1.6795 819	13.591 637	8.0922 74	1.6849 668	13.699 335	8.1303 28
¾	....	....	....	....	....	....	1.7060 289	14.120 577	8.2768 67
11	1.7103 394	14.206 787	8.3064 14	1.7215 714	14.431 428	8.3827 07	1.7273 542	14.547 084	8.4215 97
¼	....	....	....	....	....	....	1.7489 461	14.978 923	8.5645 40
½	....	....	....	1.7646 107	15.292 214	8.6660 55	1.7708 080	15.416 159	8.7057 19
¾	....	....	....	....	....	....	1.7929 431	15.858 861	8.8451 54
12	1.7958 563	15.917 127	8.8632 52	1.8087 259	16.174 519	8.9424 93	1.8153 549	16.307 097	8.9828 68
¼	....	....	....	....	....	....	1.8380 468	16.760 936	9.1188 82
½	....	....	....	1.8539 441	17.078 882	9.2121 88	1.8610 224	17.220 447	9.2532 17
¾	....	....	....	....	....	....	1.8842 852	17.685 703	9.3858 93
13	1.8856 491	17.712 983	9.3935 73	1.9002 927	18.005 854	9.4753 06	1.9078 387	18.156 774	9.5169 32
¼	....	....	....	....	....	....	1.9316 867	18.633 734	9.6463 52
½	....	....	....	1.9478 000	18.956 000	9.7320 05	1.9558 328	19.116 656	9.7741 75
¾	....	....	....	....	....	....	1.9802 807	19.605 614	9.9004 20
14	1.9799 316	19.598 632	9.8986 41	1.9964 950	19.929 900	9.9824 44	2.0050 342	20.100 684	10.025 11
¼	....	....	....	....	....	....	2.0300 971	20.601 943	10.148 25
½	....	....	....	2.0464 074	20.928 148	10.226 77	2.0554 733	21.109 467	10.269 88
¾	....	....	....	....	....	....	2.0811 668	21.623 335	10.390 00
15	2.0789 282	21.578 564	10.379 66	2.0975 676	21.951 352	10.465 15	2.1071 813	22.143 627	10.508 65
¼	....	....	....	....	....	....	2.1335 211	22.670 422	10.625 82
½	....	....	....	2.1500 068	23.000 136	10.697 70	2.1601 901	23.203 803	10.741 55
¾	....	....	....	....	....	....	2.1871 925	23.743 850	10.855 85
16	2.1828 746	23.657 492	10.837 77	2.2037 569	24.075 139	10.924 59	2.2145 324	24.290 648	10.968 74
17	2.2920 183	25.840 366	11.274 07	2.3153 221	26.306 443	11.361 89	2.3273 525	26.547 050	11.406 54
18	2.4066 192	28.132 385	11.689 59	2.4325 353	28.650 706	11.778 13	2.4459 203	28.918 405	11.823 12
19	2.5269 502	30.539 004	12.085 32	2.5556 824	31.113 648	12.174 30	2.5705 285	31.410 570	12.219 50
20	2.6532 977	33.065 954	12.462 21	2.6850 638	33.701 277	12.551 39	2.7014 849	34.029 699	12.596 67
21	2.7859 626	35.719 252	12.821 15	2.8209 952	36.419 904	12.910 30	2.8391 130	36.782 260	12.955 55
22	2.9252 607	38.505 214	13.163 00	2.9638 081	39.276 162	13.251 92	2.9837 526	39.675 051	13.297 03
23	3.0715 238	41.430 475	13.488 57	3.1138 509	42.277 017	13.577 08	3.1357 608	42.715 217	13.621 96
24	3.2250 999	44.501 999	13.798 64	3.2714 896	45.429 791	13.886 58	3.2955 132	45.910 265	13.931 14
25	3.3863 549	47.727 099	14.093 94	3.4371 087	48.742 174	14.181 16	3.4634 043	49.268 085	14.225 33

PERPETUAL STOCK: 3 *p. Cent.* 60; 3½ *p. Cent.* 70; 4 *p. Cent.* 80; 5 *p. Cent.* 100.

Years.	RATIO *of* INTEREST: *ANNUALLY,* 0.05.			RATIO *of* INTEREST: *HALF-YEARLY,* 0.025.			RATIO *of* INTEREST: *QUARTERLY,* 0.0125.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
¼	....	....	....	....	....	....	0.9876 543	4.0000 000	4.0500 000
½	....	....	....	0.9756 098	2.0000 000	2.0500 000	0.9754 611	1.9875 776	2.0375 776
¾	....	....	....	....	....	....	0.9634 183	1.3168 048	1.3668 048
1	0.9523 810	1.0000 000	1.0500 000	0.9518 145	0.9876 543	1.0376 543	0.9515 243	0.9814 441	1.0314 441
¼	....	....	....	....	....	....	0.9397 771	0.7802 485	0.8302 485
½	....	....	....	0.9285 994	0.6502 743	0.7002 743	0.9281 749	0.6461 353	0.6961 353
¾	....	....	....	....	....	....	0.9167 159	0.5503 549	0.6003 549
2	0.9070 295	0.4878 049	0.5378 049	0.9059 507	0.4816 358	0.5316 358	0.9053 984	0.4785 325	0.5285 325
¼	....	....	....	....	....	....	0.8942 207	0.4226 822	0.4726 822
½	....	....	....	0.8838 543	0.3804 938	0.4304 938	0.8831 810	0.3780 123	0.4280 123
¾	....	....	....	....	....	....	0.8722 775	0.3414 736	0.3914 736
3	0.8638 376	0.3172 085	0.3672 085	0.8622 969	0.3131 000	0.3631 000	0.8615 084	0.3110 332	0.3610 332
¼	....	....	....	....	....	....	0.8508 727	0.2852 840	0.3352 840
½	....	....	....	0.8412 652	0.2649 908	0.3149 908	0.8403 681	0.2632 206	0.3132 206
¾	....	....	....	....	....	....	0.8299 932	0.2441 058	0.2941 058
4	0.8227 025	0.2320 118	0.2820 118	0.8207 466	0.2289 347	0.2789 347	0.8197 464	0.2273 869	0.2773 869
¼	....	....	....	....	....	....	0.8096 260	0.2126 409	0.2626 409
½	....	....	....	0.8007 284	0.2009 138	0.2509 138	0.7996 306	0.1995 392	0.2495 392
¾	....	....	....	....	....	....	0.7897 587	0.1878 219	0.2378 219
5	0.7835 262	0.1809 748	0.2309 748	0.7811 984	0.1785 175	0.2285 175	0.7800 014	0.1772 816	0.2272 816
¼	....	....	....	....	....	....	0.7703 788	0.1677 500	0.2177 500
½	....	....	....	0.7621 447	0.1609 514	0.2109 514	0.7608 680	0.1590 895	0.2090 895
¾	....	....	....	....	....	....	0.7514 746	0.1511 866	0.2011 866
6	0.7462 154	0.1470 175	0.1970 175	0.7435 559	0.1449 742	0.1949 742	0.7421 970	0.1439 466	0.1939 466
¼	....	....	....	....	....	....	0.7330 342	0.1372 899	0.1872 899
½	....	....	....	0.7254 204	0.1320 965	0.1820 965	0.7239 843	0.1311 491	0.1811 491
¾	....	....	....	....	....	....	0.7150 463	0.1254 671	0.1754 671
7	0.7106 813	0.1228 198	0.1728 198	0.7077 272	0.1210 731	0.1710 731	0.7062 185	0.1201 945	0.1701 945
¼	....	....	....	....	....	....	0.6974 998	0.1152 891	0.1652 891
½	....	....	....	0.6904 656	0.1115 329	0.1615 329	0.6888 886	0.1107 142	0.1607 142
¾	....	....	....	....	....	....	0.6803 839	0.1064 377	0.1564 377
8	0.6768 394	0.1047 218	0.1547 218	0.6736 249	0.1031 980	0.1531 980	0.6719 841	0.1024 316	0.1524 316
¼	....	....	....	....	....	....	0.6636 880	0.0986 715	0.1486 715
½	....	....	....	0.6571 950	0.0958 555	0.1458 555	0.6554 943	0.0951 355	0.1451 355
¾	....	....	....	....	....	....	0.6474 018	0.0918 045	0.1418 045
9	0.6446 089	0.0906 901	0.1406 901	0.6411 659	0.0893 402	0.1393 402	0.6394 092	0.0886 613	0.1386 613
¼	....	....	....	....	....	....	0.6315 152	0.0856 908	0.1356 908
½	....	....	....	0.6255 277	0.0835 212	0.1335 212	0.6237 187	0.0828 793	0.1328 793
¾	....	....	....	....	....	....	0.6160 185	0.0802 146	0.1302 146
10	0.6139 132	0.0795 050	0.1295 050	0.6102 710	0.0782 943	0.1282 943	0.6084 134	0.0776 857	0.1276 857
¼	....	....	....	....	....	....	0.6009 020	0.0752 826	0.1252 826
½	....	....	....	0.5953 863	0.0735 747	0.1235 747	0.5934 835	0.0729 962	0.1229 962
¾	....	....	....	....	....	....	0.5861 565	0.0708 186	0.1208 186
11	0.5846 793	0.0703 889	0.1203 889	0.5808 647	0.0692 932	0.1192 932	0.5789 200	0.0687 423	0.1187 423
¼	....	....	....	....	....	....	0.5717 729	0.0667 605	0.1167 605
½	....	....	....	0.5666 973	0.0653 928	0.1153 928	0.5647 140	0.0648 670	0.1148 670
¾	....	....	....	....	....	....	0.5577 422	0.0630 562	0.1130 562
12	0.5568 375	0.0628 254	0.1128 254	0.5528 753	0.0618 256	0.1118 256	0.5508 565	0.0613 230	0.1113 230
¼	....	....	....	....	....	....	0.5440 558	0.0596 625	0.1096 625
½	....	....	....	0.5393 906	0.0585 518	0.1085 518	0.5373 390	0.0580 705	0.1080 705
¾	....	....	....	....	....	....	0.5307 052	0.0565 428	0.1065 428
13	0.5303 214	0.0564 558	0.1064 558	0.5262 347	0.0555 375	0.1055 375	0.5241 533	0.0550 759	0.1050 759
¼	....	....	....	....	....	....	0.5176 823	0.0536 661	0.1036 661
½	....	....	....	0.5133 997	0.0527 537	0.1027 537	0.5112 912	0.0523 104	0.1023 104
¾	....	....	....	....	....	....	0.5049 789	0.0510 058	0.1010 058
14	0.5050 679	0.0510 240	0.1010 240	0.5008 778	0.0501 759	0.1001 759	0.4987 446	0.0497 495	0.0997 495
¼	....	....	....	....	....	....	0.4925 873	0.0485 391	0.0985 391
½	....	....	....	0.4886 612	0.0477 825	0.0977 825	0.4865 060	0.0473 721	0.0973 721
¾	....	....	....	....	....	....	0.4804 997	0.0462 463	0.0962 463
15	0.4810 171	0.0463 423	0.0963 423	0.4767 427	0.0455 553	0.0955 553	0.4745 676	0.0451 597	0.0951 597
¼	....	....	....	....	....	....	0.4687 087	0.0441 103	0.0941 103
½	....	....	....	0.4651 148	0.0434 780	0.0934 780	0.4629 222	0.0430 964	0.0930 964
¾	....	....	....	....	....	....	0.4572 028	0.0421 162	0.0921 162
16	0.4581 115	0.0422 699	0.0922 699	0.4537 705	0.0415 366	0.0915 366	0.4515 696	0.0411 681	0.0911 681
17	0.4362 967	0.0386 991	0.0886 991	0.4319 054	0.0380 135	0.0880 135	0.4296 728	0.0376 690	0.0876 690
18	0.4155 207	0.0355 462	0.0855 462	0.4110 937	0.0349 032	0.0849 032	0.4088 441	0.0345 801	0.0845 801
19	0.3957 340	0.0327 450	0.0827 450	0.3912 849	0.0321 402	0.0821 402	0.3890 251	0.0318 364	0.0818 364
20	0.3768 895	0.0302 426	0.0802 426	0.3724 306	0.0296 725	0.0796 725	0.3701 668	0.0293 861	0.0793 861
21	0.3589 423	0.0279 961	0.0779 961	0.3544 848	0.0274 575	0.0774 575	0.3522 227	0.0271 871	0.0771 871
22	0.3418 499	0.0259 705	0.0759 705	0.3374 038	0.0254 607	0.0754 607	0.3351 484	0.0252 048	0.0752 048
23	0.3255 713	0.0241 368	0.0741 368	0.3211 458	0.0236 535	0.0736 535	0.3189 019	0.0234 109	0.0734 109
24	0.3100 680	0.0224 709	0.0724 709	0.3056 712	0.0220 120	0.0720 120	0.3034 429	0.0217 816	0.0717 816
25	0.2953 028	0.0209 525	0.0709 525	0.2909 422	0.0205 161	0.0705 161	0.2887 332	0.0202 971	0.0702 971

RATE OF INTEREST: 5 *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY,* 0.05.			RATIO *of* INTEREST: *HALF-YEARLY,* 0.025.			RATIO *of* INTEREST: *QUARTERLY,* 0.0125.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	3.5556 727	51.113 454	14.375 18	3.6111 123	52.222 247	14.461 54	3.6398 486	52.796 971	14.505 26
27	3.7334 563	54.669 126	14.643 03	3.7939 249	55.878 498	14.728 42	3.8252 819	56.505 638	14.771 63
28	3.9201 291	58.402 583	14.898 13	3.9859 924	59.719 847	14.982 43	4.0201 622	60.403 243	15.025 08
29	4.1161 356	62.322 712	15.141 07	4.1877 832	63.755 664	15.224 20	4.2249 707	64.499 413	15.266 24
30	4.3219 424	66.438 848	15.372 45	4.3997 897	67.995 795	15.454 33	4.4402 132	68.804 265	15.495 71
31	4.5380 395	70.760 790	15.592 81	4.6225 291	72.450 582	15.673 37	4.6664 214	73.328 428	15.714 06
32	4.7649 415	75.298 829	15.802 68	4.8565 446	77.130 893	15.881 85	4.9041 538	78.083 076	15.921 82
33	5.0031 885	80.063 771	16.002 55	5.1024 072	82.048 144	16.080 28	5.1539 976	83.079 951	16.119 52
34	5.2533 480	85.066 959	16.192 90	5.3607 166	87.214 332	16.269 15	5.4165 697	88.331 394	16.307 63
35	5.5160 154	90.320 307	16.374 19	5.6321 029	92.642 057	16.448 93	5.6925 187	93.850 374	16.486 62
36	5.7918 161	95.836 323	16.546 85	5.9172 281	98.344 561	16.620 04	5.9825 260	99.650 519	16.656 93
37	6.0814 069	101.62 814	16.711 29	6 2167 877	104.33 575	16.782 91	6.2873 078	105.74 616	16.818 99
38	6.3854 773	107.70 955	16.867 89	6.5315 126	110.63 025	16.937 92	6.6076 168	112.15 234	16.973 19
39	6.7047 512	114.09 502	17.017 04	6.8621 704	117.24 341	17.085 47	6.9442 440	118.88 488	17.119 92
40	7.0399 887	120.79 977	17.159 09	7.2095 678	124.19 136	17.225 91	7.2980 209	125.96 042	17.259 54
41	7.3919 881	127.83 976	17.294 37	7.5745 522	131.49 104	17.359 58	7.6698 210	133.39 642	17.392 38
42	7.7615 876	135.23 175	17.423 21	7.9580 139	139.16 028	17.486 81	8.0605 626	141.21 125	17.518 79
43	8.1496 669	142.99 334	17.545 91	8.3608 883	147.21 777	17.607 91	8.4712 107	149.42 421	17.639 06
44	8.5571 503	151.14 301	17.662 77	8.7841 583	155.68 317	17.723 17	8.9027 794	158.05 559	17.753 51
45	8.9850 078	159.70 016	17.774 07	9.2288 563	164.57 713	17.832 88	9.3563 345	167.12 669	17.862 41
46	9.4342 582	168.68 516	17.880 07	9.6960 672	173.92 134	17.937 31	9.8329 961	176.65 992	17.966 03
47	9.9059 711	178.11 942	17.981 01	10.186 931	183.73 861	18.036 70	10.333 941	186.67 883	18.064 63
48	10.401 270	188.02 539	18.077 16	10.702 644	194.05 288	18.131 30	10.860 408	197.20 815	18.158 45
49	10.921 333	198.42 666	18.168 72	11.244 465	204.88 931	18.221 35	11.413 695	208.27 389	18.247 72
50	11.467 400	209.34 800	18.255 92	11.813 716	216.27 433	18.307 05	11.995 169	219.90 338	18.332 66
51	12.040 770	220.81 540	18.338 98	12.411 786	228.23 571	18.388 63	12.606 267	232.12 534	18.413 49
52	12.642 808	232.85 617	18.418 07	13.040 132	240.80 265	18.466 27	13.248 498	244.96 995	18.490 40
53	13.274 949	245.49 898	18.493 40	13.700 289	254.00 578	18.540 17	13.923 447	258.46 894	18.563 57
54	13.938 696	258.77 392	18.565 14	14.393 866	267.87 732	18.610 52	14.632 781	272.65 563	18.633 21
55	14.635 631	272.71 262	18.633 47	15.122 555	282.45 111	18.677 47	15.378 253	287.56 507	18.699 46
56	15.367 413	287.34 825	18.698 54	15.888 135	297.76 270	18.741 20	16.161 704	303.23 408	18.762 51
57	16.135 783	302.71 506	18.760 52	16.692 472	313.84 944	18.801 86	16.985 067	319.70 134	18.822 50
58	16.942 572	318.85 145	18.819 54	17.537 528	330.75 057	18.859 59	17.850 377	337.00 754	18.879 58
59	17.789 701	335.79 402	18.875 75	18.425 366	348.50 731	18.914 54	18.759 771	355.19 541	18.933 89
60	18.679 186	353.58 372	18.929 29	19.358 150	367.16 300	18.966 85	19.715 494	374.30 987	18.985 57
61	19.613 145	372.26 291	18.980 27	20.338 156	386.76 312	19.016 63	20.719 906	394.39 812	19.034 75
62	20.593 803	391.87 605	19.028 83	21.367 775	407.35 551	19.064 01	21.775 489	415.50 977	19.081 54
63	21.623 493	412.46 986	19.075 08	22.449 519	428.99 038	19.109 11	22.884 848	437.69 696	19.126 06
64	22.704 667	434.09 335	19.119 12	23.586 026	451.72 052	19.152 03	24.050 724	461.01 449	19.168 42
65	23.839 901	456.79 802	19.161 07	24.780 068	475.60 137	19.192 90	25.275 997	485.51 993	19.208 74
66	25.031 896	480.63 792	19.201 02	26.034 559	500.69 119	19.231 79	26.563 691	511.27 382	19.247 09
67	26.283 491	505.66 981	19.239 07	27.352 559	527.05 118	19.268 81	27.916 987	538.33 974	19.283 59
68	27.597 665	531.95 330	19.275 30	28.737 282	554.74 564	19.304 04	29.339 227	566.78 455	19.318 32
69	28.977 548	559.55 097	19.309 81	30.192 107	583.84 214	19.337 57	30.833 924	596.67 848	19.351 36
70	30.426 426	588.52 852	19.342 68	31.720 583	614.41 165	19.369 49	32.404 769	628.09 538	19.382 81
71	31.947 747	618.95 494	19.373 98	33.326 437	646.52 874	19.399 88	34.055 641	661.11 281	19.412 73
72	33.545 134	650.90 269	19.403 79	35.013 588	680.27 176	19.428 79	35.790 617	695.81 234	19.441 19
73	35.222 391	684.44 782	19.432 18	36.786 151	715.72 302	19.456 32	37.613 982	732.27 964	19.468 28
74	36.983 511	719.67 021	19.459 22	38.648 450	752.96 899	19.482 51	39.530 239	770.60 478	19.494 06
75	38.832 686	756.65 373	19.484 97	40.605 027	792.10 054	19.507 45	41.544 120	810.88 240	19.518 59
76	40.774 321	795.48 641	19.509 49	42.660 657	833.21 314	19.531 18	43.660 599	853.21 199	19.541 92
77	42.813 037	836.26 073	19.532 85	44.820 353	876.40 706	19.553 78	45.884 903	897.69 807	19.564 12
78	44.953 668	879.07 377	19.555 10	47.089 383	921.78 766	19.575 28	48.222 525	944.45 050	19.585 26
79	47.201 373	924.02 746	19.576 28	49.473 283	969.46 566	19.595 74	50.679 238	993.58 476	19.605 36
80	49.561 441	971.22 883	19.596 46	51.977 868	1019.5 574	19.615 22	53.261 109	1045.2 222	19.624 49
81	52.039 514	1020.7 903	19.615 68	54.609 248	1072.1 850	19.633 76	55.974 514	1099.4 903	19.642 69
82	54.641 489	1072.8 298	19.633 98	57.373 841	1127.4 768	19.651 41	58.826 154	1156.5 231	19.660 02
83	57.373 564	1127.4 713	19.651 41	60.278 392	1185.5 678	19.668 20	61.823 073	1216.4 615	19.676 50
84	60.242 242	1184.8 448	19.668 01	63.329 985	1246.5 997	19.684 19	64.972 670	1279.4 534	19.692 18
85	63.254 354	1245.0 871	19.683 82	66.536 066	1310.7 213	19.699 41	68.282 725	1345.6 545	19.707 10
86	66.417 072	1308.3 414	19.698 87	69.904 454	1378.0 891	19.713 89	71.761 411	1415.2 282	19.721 30
87	69.737 925	1374.7 585	19.713 21	73.443 367	1448.8 673	19.727 68	75.417 320	1488.3 464	19.734 81
88	73.224 822	1444.4 964	19.726 87	77.161 437	1523.2 287	19.740 80	79.259 481	1565.1 896	19.747 67
89	76.886 063	1517.7 213	19.739 87	81.067 735	1601.3 547	19.753 29	83.297 382	1645.9 476	19.759 90
90	80.730 366	1594.6 073	19.752 26	85.171 789	1683.4 358	19.765 18	87.540 995	1730.8 199	19.771 54
91	84.766 884	1675.3 377	19.764 06	89.483 611	1769.6 722	19.776 50	92.000 801	1820.0 160	19.782 61
92	89.005 228	1760.1 046	19.775 29	94.013 719	1860.2 744	19.787 26	96.687 812	1913.7 562	19.793 15
93	93.455 490	1849.1 098	19.785 99	98.773 163	1955.4 633	19.797 52	101.61 361	2012.2 721	19.803 18
94	98.128 264	1942.5 653	19.796 18	103.77 355	2055.4 711	19.807 27	106.79 034	2115.8 069	19.812 72
95	103.03 468	2040.6 935	19.805 89	109.02 709	2160.5 418	19.816 56	112.23 082	2224.6 163	19 821 80
96	108.18 641	2143.7 282	19.815 13	114.54 659	2270.9 317	19.825 39	117.94 845	2338.9 690	19.830 44
97	113.59 573	2251.9 147	19.823 94	120.34 551	2386.9 102	19.833 81	123.95 738	2459.1 475	19.838 65
98	119.27 552	2366.5 104	19.832 32	126.43 800	2508.7 600	19.841 82	130.27 243	2585.4 485	19.846 47
99	125.23 930	2484.7 859	19.840 30	132.83 892	2636.7 785	19.849 44	136.90 920	2718.1 840	19.853 92
100	131.50 196	2610.0 252	19.847 91	139.56 389	2771.2 779	19.856 70	143.88 408	2857.8 817	16.861 02
	Value of Perpetual Ann.		20.000 00	- - - - - - - - - -		20.000 00	- - - - - - - - - - -		20.000 00

PERPETUAL STOCK: 3 *p. Cent.* 60; 3½ *p. Cent.* 70; 4 *p. Cent.* 80; 5 *p. Cent.* 100.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.05.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.025.			RATIO *of* INTEREST: *QUARTERLY*, 0.0125.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.2812 407	0.0195 643	0.0695 643	0.2769 230	0.0191 489	0.0691 489	0.2747 367	0.0189 405	0.0689 405
27	0.2678 483	0.0182 919	0.0682 919	0.2635 793	0.0178 960	0.0678 960	0.2614 186	0.0176 973	0.0676 973
28	0.2550 936	0.0171 225	0.0671 225	0.2508 786	0.0167 449	0.0667 449	0.2487 462	0.0165 554	0.0665 554
29	0.2429 463	0.0160 455	0.0660 455	0.2387 898	0.0156 849	0.0656 849	0.2366 880	0.0155 040	0.0655 040
30	0.2313 775	0.0150 514	0.0650 514	0.2272 836	0.0147 068	0.0647 068	0.2252 144	0.0145 340	0.0645 340
31	0.2203 595	0.0141 321	0.0641 321	0.2163 318	0.0138 025	0.0638 025	0.2142 970	0.0136 373	0.0636 373
32	0.2098 662	0.0132 804	0.0632 804	0.2059 077	0.0129 650	0.0629 650	0.2039 088	0.0128 069	0.0628 069
33	0.1998 725	0.0124 900	0.0624 900	0.1959 859	0.0121 880	0.0621 880	0.1940 241	0.0120 366	0.0620 366
34	0.1903 548	0.0117 554	0.0617 554	0.1865 422	0.0114 660	0.0614 660	0.1846 187	0.0113 210	0.0613 210
35	0.1812 903	0.0110 717	0.0610 717	0.1775 536	0.0107 942	0.0607 942	0.1756 692	0.0106 553	0.0606 553
36	0.1726 574	0.0104 345	0.0604 345	0.1689 980	0.0101 683	0.0601 683	0.1671 535	0.0100 351	0.0600 351
37	0.1644 356	0.0098 398	0.0598 398	0.1608 548	0.0095 844	0.0595 844	0.1590 506	0.0094 566	0.0594 566
38	0.1566 054	0.0092 842	0.0592 842	0.1531 039	0.0090 391	0.0590 391	0.1513 405	0.0089 164	0.0589 164
39	0.1491 480	0.0087 646	0.0587 646	0.1457 265	0.0085 293	0.0585 293	0.1440 042	0.0084 115	0.0584 115
40	0.1420 457	0.0082 782	0.0582 782	0.1387 046	0.0080 521	0.0580 521	0.1370 234	0.0079 391	0.0579 391
41	0.1352 816	0.0078 223	0.0578 223	0.1320 210	0.0076 051	0.0576 051	0.1303 811	0.0074 965	0.0574 965
42	0.1288 396	0.0073 947	0.0573 947	0.1256 595	0.0071 860	0.0571 860	0.1240 608	0.0070 816	0.0570 816
43	0.1227 044	0.0069 933	0.0569 933	0.1196 045	0.0067 927	0.0567 927	0.1180 469	0.0066 924	0.0566 924
44	0.1168 613	0.0066 163	0.0566 163	0.1138 413	0.0064 233	0.0564 233	0.1123 245	0.0063 269	0.0563 269
45	0.1112 965	0.0062 617	0.0562 617	0.1083 558	0.0060 762	0.0560 762	0.1068 795	0.0059 835	0.0559 835
46	0.1059 967	0.0059 282	0.0559 282	0.1031 346	0.0057 497	0.0557 497	0.1016 984	0.0056 606	0.0556 606
47	0.1009 492	0.0056 142	0.0556 142	0.0981 650	0.0054 425	0.0554 425	0.0967 685	0.0053 568	0.0553 568
48	0.0961 421	0.0053 184	0.0553 184	0.0934 349	0.0051 532	0.0551 532	0.0920 776	0.0050 708	0.0550 708
49	0.0915 639	0.0050 396	0.0550 396	0.0889 326	0.0048 807	0.0548 807	0.0876 140	0.0048 014	0.0548 014
50	0.0872 037	0.0047 767	0.0547 767	0.0846 474	0.0046 238	0.0546 238	0.0833 669	0.0045 475	0.0545 475
51	0.0830 512	0.0045 287	0.0545 287	0.0805 686	0.0043 814	0.0543 814	0.0793 256	0.0043 080	0.0543 080
52	0.0790 964	0.0042 945	0.0542 945	0.0766 864	0.0041 528	0.0541 528	0.0754 803	0.0040 821	0.0540 821
53	0.0753 299	0.0040 733	0.0540 733	0.0729 912	0.0039 369	0.0539 369	0.0718 213	0.0038 689	0.0538 689
54	0.0717 427	0.0038 644	0.0538 644	0.0694 740	0.0037 331	0.0537 331	0.0683 397	0.0036 676	0.0536 676
55	0.0683 264	0.0036 669	0.0536 669	0.0661 264	0.0035 404	0.0535 404	0.0650 269	0.0034 775	0.0534 775
56	0.0650 728	0.0034 801	0.0534 801	0.0629 401	0.0033 584	0.0533 584	0.0618 747	0.0032 978	0.0532 978
57	0.0619 741	0.0033 034	0.0533 034	0.0599 072	0.0031 862	0.0531 862	0.0588 752	0.0031 279	0.0531 279
58	0.0590 229	0.0031 363	0.0531 363	0.0570 206	0.0030 234	0.0530 234	0.0560 212	0.0029 673	0.0529 673
59	0.0562 123	0.0029 780	0.0529 780	0.0542 730	0.0028 694	0.0528 694	0.0533 056	0.0028 154	0.0528 154
60	0.0535 355	0.0028 282	0.0528 282	0.0516 578	0.0027 236	0.0527 236	0.0507 215	0.0026 716	0.0526 716
61	0.0509 862	0.0026 863	0.0526 863	0.0491 687	0.0025 856	0.0525 856	0.0482 628	0.0025 355	0.0525 355
62	0.0485 583	0.0025 518	0.0525 518	0.0467 994	0.0024 549	0.0524 549	0.0459 232	0.0024 067	0.0524 067
63	0.0462 460	0.0024 244	0.0524 244	0.0445 444	0.0023 311	0.0523 311	0.0436 970	0.0022 847	0.0522 847
64	0.0440 438	0.0023 037	0.0523 037	0.0423 980	0.0022 138	0.0522 138	0.0415 788	0.0021 691	0.0521 691
65	0.0419 465	0.0021 892	0.0521 892	0.0403 550	0.0021 026	0.0521 026	0.0395 632	0.0020 596	0.0520 596
66	0.0399 490	0.0020 806	0.0520 806	0.0384 105	0.0019 972	0.0519 972	0.0376 464	0.0019 559	0.0519 559
67	0.0380 467	0.0019 776	0.0519 776	0.0365 597	0.0018 973	0.0518 973	0.0358 205	0.0018 576	0.0518 576
68	0.0362 349	0.0018 799	0.0518 799	0.0347 980	0.0018 026	0.0518 026	0.0340 841	0.0017 643	0.0517 643
69	0.0345 095	0.0017 871	0.0517 871	0.0331 212	0.0017 128	0.0517 128	0.0324 318	0.0016 759	0.0516 759
70	0.0328 662	0.0016 992	0.0516 992	0.0315 253	0.0016 276	0.0516 276	0.0308 597	0.0015 921	0.0515 921
71	0.0313 011	0.0016 156	0.0516 156	0.0300 062	0.0015 467	0.0515 467	0.0293 637	0.0015 126	0.0515 126
72	0.0298 106	0.0015 363	0.0515 363	0.0285 603	0.0014 700	0.0514 700	0.0279 403	0.0014 372	0.0514 372
73	0.0283 910	0.0014 610	0.0514 610	0.0271 841	0.0013 972	0.0513 972	0.0265 859	0.0013 656	0.0513 656
74	0.0270 391	0.0013 895	0.0513 895	0.0258 743	0.0013 281	0.0513 281	0.0252 971	0.0012 977	0.0512 977
75	0.0257 515	0.0013 216	0.0513 216	0.0246 275	0.0012 625	0.0512 625	0.0240 708	0.0012 332	0.0512 332
76	0.0245 252	0.0012 571	0.0512 571	0.0234 408	0.0012 002	0.0512 002	0.0229 039	0.0011 720	0.0511 720
77	0.0233 574	0.0011 958	0.0511 958	0.0223 113	0.0011 410	0.0511 410	0.0217 937	0.0011 140	0.0511 140
78	0.0222 451	0.0011 376	0.0511 376	0.0212 362	0.0010 848	0.0510 848	0.0207 372	0.0010 588	0.0510 588
79	0.0211 858	0.0010 822	0.0510 822	0.0202 129	0.0010 315	0.0510 315	0.0197 319	0.0010 065	0.0510 065
80	0.0201 770	0.0010 296	0.0510 296	0.0192 390	0.0009 808	0.0509 808	0.0187 754	0.0009 567	0.0509 567
81	0.0192 162	0.0009 796	0.0509 796	0.0183 119	0.0009 327	0.0509 327	0.0178 653	0.0009 095	0.0509 095
82	0.0183 011	0.0009 321	0.0509 321	0.0174 295	0.0008 869	0.0508 869	0.0169 992	0.0008 647	0.0508 647
83	0.0174 296	0.0008 869	0.0508 869	0.0165 897	0.0008 435	0.0508 435	0.0161 752	0.0008 221	0.0508 221
84	0.0165 996	0.0008 440	0.0508 440	0.0157 903	0.0008 022	0.0508 022	0.0153 911	0.0007 816	0.0507 816
85	0.0158 092	0.0008 032	0.0508 032	0.0150 294	0.0007 629	0.0507 629	0.0146 450	0.0007 431	0.0507 431
86	0.0150 564	0.0007 643	0.0507 643	0.0143 052	0.0007 256	0.0507 256	0.0139 351	0.0007 066	0.0507 066
87	0.0143 394	0.0007 274	0.0507 274	0.0136 159	0.0006 902	0.0506 902	0.0132 596	0.0006 719	0.0506 719
88	0.0136 566	0.0006 923	0.0506 923	0.0129 598	0.0006 565	0.0506 565	0.0126 168	0.0006 389	0.0506 389
89	0.0130 063	0.0006 589	0.0506 589	0.0123 354	0.0006 245	0.0506 245	0.0120 052	0.0006 076	0.0506 076
90	0.0123 869	0.0006 271	0.0506 271	0.0117 410	0.0005 940	0.0505 940	0.0114 232	0.0005 778	0.0505 778
91	0.0117 971	0.0005 969	0.0505 969	0.0111 752	0.0005 651	0.0505 651	0.0108 695	0.0005 494	0.0505 494
92	0.0112 353	0.0005 681	0.0505 681	0.0106 367	0.0005 376	0.0505 376	0.0103 426	0.0005 225	0.0505 225
93	0.0107 003	0.0005 408	0.0505 408	0.0101 242	0.0005 114	0.0505 114	0.0098 412	0.0004 970	0.0504 970
94	0.0101 907	0.0005 148	0.0505 148	0.0096 364	0.0004 865	0.0504 865	0.0093 641	0.0004 726	0.0504 725
95	0.0097 055	0.0004 900	0.0504 900	0.0091 720	0.0004 628	0.0504 628	0.0089 101	0.0004 495	0.0504 495
96	0.0092 433	0.0004 665	0.0504 665	0.0087 301	0.0004 403	0.0504 403	0.0084 783	0.0004 275	0.0504 275
97	0.0088 031	0.0004 441	0.0504 441	0.0083 094	0.0004 190	0.0504 190	0.0080 673	0.0004 066	0.0504 066
98	0.0083 840	0.0004 227	0.0504 227	0.0079 090	0.0003 986	0.0503 986	0.0076 762	0.0003 868	0.0503 868
99	0.0079 847	0.0004 024	0.0504 024	0.0075 279	0.0003 793	0.0503 793	0.0073 041	0.0003 679	0.0503 679
100	0.0076 045	0.0003 831	0.0503 831	0.0071 652	0.0003 608	0.0503 608	0.0069 500	0.0003 499	0.0503 499
·	Ratio of Perpetual Anu.		0.0500 000	- - - - - - - - - - - -		0.0500 000	- - - - - - - - - - -		0.0500 000

RATE OF INTEREST: 5¼ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0525.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02625			RATIO *of* INTEREST: *QUARTERLY*, 0.013125.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
¼	....	....	....	....	....	....	1.0131 250	0.2500 000	0.2467 61
½	....	....	....	1.0262 500	0.5000 000	0.4872 11	1.0264 223	0.5032 813	0.4903 26
¾	....	....	....	....	....	....	1.0398 941	0.7598 868	0.7307 35
1	1.0525 000	1.0000 000	0.9501 19	1.0531 891	1.0131 250	0.9619 59	1.0535 427	1.0198 603	0.9680 29
¼	....	....	....	....	....	....	1.0673 704	1.2832 460	1.2022 50
½	....	....	....	1.0808 353	1.5397 195	1.4245 64	1.0813 797	1.5500 886	1.4334 36
¾	....	....	....	....	....	....	1.0955 728	1.8204 335	1.6616 27
2	1.1077 563	2.0525 000	1.8528 44	1.1092 072	2.0801 372	1.8753 37	1.1099 522	2.0943 207	1.8868 62
¼	....	....	....	....	....	....	1.1245 203	2.3718 147	2.1091 79
½	....	....	....	1.1383 239	2.6347 408	2.3145 79	1.1392 796	2.6529 448	2.3286 16
¾	....	....	....	....	....	....	1.1542 326	2.9377 647	2.5452 10
3	1.1659 135	3.1602 563	2.7105 41	1.1682 049	3.2039 027	2.7425 86	1.1693 880	3.2263 229	2.7589 98
¼	....	....	....	....	....	....	1.1847 301	3.5186 684	2.9700 17
½	....	....	....	1.1988 703	3.7880 052	3.1596 46	1.2002 797	3.8148 509	3.1783 02
¾	....	....	....	....	....	....	1.2160 333	4.1149 208	3.3838 88
4	1.2271 239	4.3261 697	3.5254 55	1.2303 406	4.3874 403	3.5660 37	1.2319 938	4.4189 291	3.5868 11
¼	....	....	....	....	....	....	1.2481 637	4.7269 276	3.7871 06
½	....	....	....	1.2626 371	5.0026 106	3.9620 34	1.2645 451	5.0389 546	3.9848 06
¾	....	....	....	....	....	....	1.2811 430	5.3551 050	4.1799 43
5	1.2915 479	5.5532 936	4.2997 19	1.2957 813	5.6339 291	4.3479 01	1.2979 580	5.6753 907	4.3725 53
¼	....	....	....	....	....	....	1.3149 937	5.9998 802	4.5626 68
½	....	....	....	1.3297 955	6.2818 198	4.7238 99	1.3322 530	6.3286 287	4.7503 21
¾	....	....	....	....	....	....	1.3497 388	6.6616 919	4.9355 41
6	1.3593 542	6.8448 415	5.0353 63	1.3647 027	6.9467 175	5.0902 79	1.3674 541	6.9991 266	5.1183 63
¼	....	....	....	....	....	....	1.3854 020	7.3409 901	5.2988 16
½	....	....	....	1.4005 261	7.6290 689	5.4472 88	1.4035 854	7.6873 406	5.4769 31
¾	....	....	....	....	....	....	1.4220 074	8.0382 370	5.6527 39
7	1.4307 203	8.2041 957	5.7343 11	1.4372 899	8.3293 319	5.7951 65	1.4406 713	8.3937 388	5.8262 69
¼	....	....	....	....	....	....	1.4595 801	8.7539 067	5.9975 51
½	....	....	....	1.4750 188	9.0479 769	6.1341 43	1.4787 371	9.1188 017	6.1666 15
¾	....	....	....	....	....	....	1.4981 455	9.4884 860	6.3334 88
8	1.5058 331	9.6349 160	6.3983 95	1.5137 380	9.7854 863	6.4644 52	1.5178 087	9.8630 223	6.4981 99
¼	....	....	....	....	....	....	1.5377 299	10.242 475	6.6607 76
½	....	....	....	1.5534 737	10.542 355	6.7863 11	1.5579 196	10.626 907	6.8212 47
¾	....	....	....	....	....	....	1.5783 602	11.016 385	6.9796 39
9	1.5848 893	11.140 749	7.0293 54	1 5942 523	11.319 092	7.0999 38	1.5990 762	11.410 975	7.1359 80
¼	....	....	....	....	....	....	1.6200 641	11.810 744	7.2902 95
½	....	....	....	1.6361 015	12.116 218	7.4055 42	1.6413 274	12.215 760	7.4426 10
¾	....	....	....	....	....	....	1.6628 698	12.626 092	7.5929 53
10	1.6680 960	12.725 638	7.6288 40	1.6790 491	12.934 269	7.7033 30	1.6846 950	13.041 810	7.7413 48
¼	....	....	....	....	....	....	1.7068 066	13.462 983	7.8878 20
½	....	....	....	1.7231 242	13.773 794	7.9935 00	1.7292 085	13.889 685	8.0323 95
¾	....	....	....	....	....	....	1.7519 043	14.321 987	8.1750 97
11	1.7556 711	14.393 734	8.1984 23	1.7683 562	14.635 356	8.2762 49	1.7748 981	14.759 963	8.3159 50
¼	....	....	....	....	....	....	1.7981 936	15.203 688	8.4549 78
½	....	....	....	1.8147 755	15.519 534	8.5517 65	1.8217 947	15.653 236	8.5922 05
¾	....	....	....	....	....	....	1.8457 060	16.108 685	8.7276 55
12	1.8478 438	16.149 405	8.7395 94	1.8624 134	16.426 922	8.8202 84	1.8699 308	16.570 111	8.8613 50
¼	....	....	....	....	....	....	1.8944 737	17.037 594	8.9933 15
½	....	....	....	1.9113 017	17.358 128	9.0818 36	1.9193 387	17.511 212	9.1236 08
¾	....	....	....	....	....	....	1.9445 300	17.991 047	9.2521 33
13	1.9448 556	17.997 249	9.2537 71	1.9614 734	18.313 779	9.3367 46	1.9700 519	18.477 180	9.3790 34
¼	....	....	....	....	....	....	1.9959 089	18.969 693	9.5042 90
½	....	....	....	2.0129 621	19.294 516	9.5851 36	2.0221 052	19.468 670	9.6279 23
¾	....	....	....	....	....	....	2.0486 453	19.974 196	9.7499 55
14	2.0469 605	19.942 105	9.7423 01	2.0658 023	20.300 997	9.8271 73	2.0755 338	20.486 357	9.8704 06
¼	....	....	....	....	....	....	2.1027 751	21.006 241	9.9898 97
½	....	....	....	2.1200 296	21.333 898	10.063 02	2.1303 741	21.530 935	10.106 65
¾	....	....	....	....	....	....	2.1583 362	22.063 528	10.222 48
15	2.1544 259	21.989 065	10.206 46	2.1756 804	22.393 913	10.292 83	2.1866 634	22.603 112	10.336 81
¼	....	....	....	....	....	....	2.2153 633	23.149 778	10.449 65
½	....	....	....	2.2327 980	23.481 753	10.516 77	2.2444 400	23.703 619	10.561 40
¾	....	....	....	....	....	....	2.2738 983	24.264 729	10.670 98
16	2.2675 333	24.143 491	10.647 47	2.2914 028	24.598 149	10.734 97	2.3037 432	24.833 203	10.779 50
17	2.3865 788	26.411 025	11.066 48	2.4132 804	26.919 627	11.154 79	2.4270 917	27.182 699	11.199 70
18	2.5118 742	28.797 603	11.464 59	2.5416 405	29.364 581	11.553 40	2.5570 447	29.657 994	11.598 54
19	2.6437 476	31.309 478	11.842 84	2.6768 280	31.939 581	11.931 88	2.6939 557	32.265 822	11.977 12
20	2.7825 443	33.953 225	12.202 22	2.8192 060	34.651 548	12.291 24	2.8381 973	35.013 281	12.336 45
21	2.9286 279	36.735 769	12.543 68	2.9691 569	37.507 750	12.632 46	2.9901 619	37.907 846	12.677 52
22	3.0823 809	39.664 397	12.868 10	3.1270 836	40.515 877	12.956 44	3.1502 631	40.967 393	13.001 26
23	3.2442 059	42.746 778	13.176 35	3.2934 102	43.684 004	13.264 06	3.3189 366	44.170 222	13.308 55
24	3.4145 207	45.990 984	13.469 21	3.4686 836	47.020 640	13.556 15	3.4966 414	47.555 074	13.600 22
25	3.5937 893	49.405 311	13.747 47	3.6530 743	50.534 749	13.833 48	3.6838 609	51.121 159	13.877 06

PERPETUAL STOCK: 3 *p. C.* 57,1429; 3½ *p. C.* 66,6667; 4 *p. C.* 76,1905; 5 *p. C.* 95,2381.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0525.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02625.			RATIO *of* INTEREST: *QUARTERLY*, 0.013125.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
¼	....	....	....	....	....	....	0.9870 450	4.0000 000	4.0525 000
½	....	....	....	0.9744 214	2.0000 000	2.0525 000	0.9742 579	1.9869 606	2.0394 606
¾	....	....	....	....	....	....	0.9616 364	1.3159 855	1.3684 855
1	0.9501 188	1.0000 000	1.0525 000	0.9494 971	0.9870 450	1.0395 450	0.9491 784	0.9805 264	1.0330 264
¼	....	....	....	....	....	....	0.9368 819	0.7792 737	0.8317 737
½	....	....	....	0.9252 104	0.6494 690	0.7019 690	0.9247 446	0.6451 245	0.6976 245
¾	....	....	....	....	....	....	0.9127 646	0.5493 197	0.6018 197
2	0.9027 257	0.4872 107	0.5397 107	0.9015 448	0.4807 375	0.5332 375	0.9009 397	0.4774 804	0.5299 804
¼	....	....	....	....	....	....	0.8892 681	0.4216 181	0.4741 181
½	....	....	....	0.8784 846	0.3795 440	0.4320 440	0.8777 477	0.3769 397	0.4294 397
¾	....	....	....	....	....	....	0.8663 765	0.3403 949	0.3928 949
3	0.8576 966	0.3164 300	0.3689 300	0.8560 142	0.3121 193	0.3646 193	0.8551 526	0.3099 504	0.3624 504
¼	....	....	....	....	....	....	0.8440 741	0.2841 984	0.3366 984
½	....	....	....	0.8341 187	0.2639 912	0.3164 912	0.8331 392	0.2621 334	0.3146 334
¾	....	....	....	....	....	....	0.8223 459	0.2430 181	0.2955 181
4	0.8149 137	0.2311 514	0.2836 514	0.8127 830	0.2279 286	0.2804 286	0.8116 924	0.2262 992	0.2787 992
¼	....	....	....	....	....	....	0.8011 770	0.2115 539	0.2640 539
½	....	....	....	0.7919 932	0.1998 956	0.2523 956	0.7907 977	0.1984 539	0.2509 539
¾	....	....	....	....	....	....	0.7805 530	0.1867 377	0.2392 377
5	0.7742 644	0.1800 733	0.2325 733	0.7717 352	0.1774 960	0.2299 960	0.7704 409	0.1761 993	0.2286 993
¼	....	....	....	....	....	....	0.7604 598	0.1666 700	0.2191 700
½	....	....	....	0.7519 953	0.1591 895	0.2116 895	0.7506 082	0.1580 121	0.2105 121
¾	....	....	....	....	....	....	0.7408 841	0.1501 120	0.2026 120
6	0.7356 435	0.1460 954	0.1985 954	0.7327 603	0.1439 529	0.1964 529	0.7312 860	0.1428 750	0 1953 750
¼	....	....	....	....	....	....	0.7218 122	0.1362 214	0.1887 214
½	....	....	....	0.7140 174	0.1310 776	0.1835 776	0.7124 611	0.1300 831	0.1825 831
¾	....	....	....	....	....	....	0.7032 312	0.1244 054	0.1769 054
7	0.6989 487	0.1218 889	0.1743 889	0.6957 538	0.1200 577	0.1725 577	0.6941 209	0.1191 364	0.1716 364
¼	....	....	....	....	....	....	0.6851 286	0.1142 347	0.1667 347
½	....	....	....	0.6779 574	0.1105 219	0.1630 219	0.6762 527	0.1096 635	0.1621 635
¾	....	....	....	....	....	....	0.6674 919	0.1053 909	0.1578 909
8	0.6640 842	0.1037 892	0.1562 892	0.6606 163	0.1021 922	0.1546 922	0.6588 445	0.1013 888	0.1538 888
¼	....	....	....	....	....	....	0.6503 093	0.0976 327	0.1501 327
½	....	....	....	0.6437 187	0.0948 555	0.1473 555	0.6418 846	0.0941 008	0.1466 008
¾	....	....	....	....	....	....	0.6335 689	0.0907 739	0.1432 739
9	0.6309 589	0.0897 606	0.1422 606	0.6272 533	0.0883 463	0.1408 463	0.6253 611	0.0876 349	0.1401 349
¼	....	....	....	....	....	....	0.6172 595	0.0846 687	0.1371 687
½	....	....	....	0.6112 090	0.0825 340	0.1350 340	0.6092 630	0.0818 615	0.1343 615
¾	....	....	....	....	....	....	0.6013 700	0.0792 011	0.1317 011
10	0.5994 859	0.0785 815	0.1310 815	0.5955 752	0.0773 140	0.1298 140	0.5935 792	0.0766 765	0.1291 765
¼	....	....	....	....	....	....	0.5858 895	0.0742 777	0.1267 777
½	....	....	....	0.5803 412	0.0726 016	0.1251 016	0.5782 993	0.0719 959	0.1244 959
¾	....	....	....	....	....	....	0.5708 074	0.0698 227	0.1223 227
11	0.5695 828	0.0694 747	0.1219 747	0.5654 970	0.0683 277	0.1208 277	0.5634 126	0.0677 508	0.1202 508
¼	....	....	....	....	....	....	0.5561 136	0.0657 735	0.1182 735
½	....	....	....	0.5510 324	0.0644 349	0.1169 349	0.5489 092	0.0638 846	0.1163 846
¾	....	....	....	....	....	....	0.5417 981	0.0620 783	0.1145 783
12	0.5411 713	0.0619 218	0.1144 218	0.5369 377	0.0608 757	0.1133 757	0.5347 791	0.0603 496	0.1128 496
¼	....	....	....	....	....	....	0.5278 589	0.0586 937	0.1111 937
½	....	....	....	0.5232 037	0.0576 099	0.1101 099	0.5210 128	0.0571 063	0.1096 063
¾	....	....	....	....	....	....	0.5142 631	0.0555 832	0.1080 832
13	0.5141 770	0.0555 640	0.1080 640	0.5098 208	0.0546 037	0.1071 037	0.5076 008	0.0541 208	0.1066 208
¼	....	....	....	....	....	....	0.5010 249	0.0527 157	0.1052 157
½	....	....	....	0.4967 804	0.0518 282	0.1043 282	0.4945 341	0.0513 646	0.1038 646
¾	....	....	....	....	....	....	0.4881 274	0.0500 646	0.1025 646
14	0.4885 292	0.0501 452	0.1026 452	0.4840 734	0.0492 587	0.1017 587	0.4818 038	0.0488 130	0.1013 130
¼	....	....	....	....	....	....	0.4755 620	0.0476 072	0.1001 072
½	....	....	....	0.4716 915	0.0468 738	0.0993 738	0.4694 011	0.0464 448	0.0989 448
¾	....	....	....	....	....	....	0.4633 201	0.0453 237	0.0978 237
15	0.4641 607	0.0454 771	0.0979 771	0.4596 263	0.0446 550	0.0971 550	0.4573 122	0.0442 417	0.0967 417
¼	....	....	....	....	....	....	0.4513 932	0.0431 970	0.0956 970
½	....	....	....	0.4478 697	0.0425 863	0.0950 863	0.4455 454	0.0421 877	0.0946 877
¾	....	....	....	....	....	....	0.4397 734	0.0412 121	0.0937 121
16	0.4410 079	0.0414 190	0.0939 190	0.4364 139	0.0406 535	0.0931 535	0 4340 761	0.0402 687	0.0927 687
17	0.4190 098	0.0378 630	0.0903 630	0.4143 739	0.0371 476	0.0896 476	0.4120 138	0.0367 881	0.0892 881
18	0.3981 091	0.0347 251	0.0872 251	0.3934 407	0.0340 546	0.0865 546	0.3910 765	0.0337 177	0.0862 177
19	0.3782 510	0.0319 392	0.0844 392	0.3735 766	0.0313 091	0.0838 091	0.3712 013	0.0309 925	0.0834 925
20	0.3593 833	0.0294 524	0.0819 524	0.3547 098	0.0288 587	0.0813 587	0.3523 363	0.0285 606	0.0810 606
21	0.3414 568	0.0272 214	0.0797 214	0.3367 959	0.0266 612	0.0791 612	0.3344 301	0.0263 798	0.0788 798
22	0.3244 245	0.0252 115	0.0777 115	0.3197 868	0.0246 817	0.0771 817	0.3174 338	0.0244 156	0.0769 156
23	0.3082 418	0.0233 936	0.0758 936	0.3036 366	0.0228 917	0.0753 917	0.3013 013	0.0226 397	0.0751 397
24	0.2928 664	0.0217 434	0.0742 434	0.2883 021	0.0212 673	0.0737 673	0.2859 887	0.0210 282	0.0735 282
25	0.2782 578	0.0202 407	0.0727 407	0.2737 480	0.0197 884	0.0722 884	0.2714 544	0.0195 614	0.0720 614

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0525.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02625.			RATIO *of* INTEREST: *QUARTERLY*, 0.013125.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	3.7824 633	52.999 300	14.011 85	3.8473 779	54.235 770	14.096 81	3.8811 046	54.878 183	14.139 84
27	3.9810 426	56.781 763	14.263 04	4.0520 163	58.133 644	14.346 84	4.0889 093	58.836 368	14.389 26
28	4.1900 473	60.762 806	14.501 70	4.2675 393	62.238 843	14.584 25	4.3078 404	63.006 484	14.626 00
29	4.4100 248	64.952 853	14.728 46	4.4945 257	66.562 394	14.809 66	4.5384 937	67.399 879	14.850 72
30	4.6415 511	69.362 878	14.943 90	4.7335 853	71.115 910	15.023 69	4.7814 967	72.009 462	15.064 02
31	4.8852 325	74.004 429	15.148 60	4.9853 603	75.911 624	15.226 91	5.0375 108	76.904 968	15.266 46
32	5.1417 072	78.889 662	15.343 09	5.2505 269	80.962 417	15.419 87	5.3072 326	82.042 525	15.458 63
33	5.4116 469	84.031 369	15.527 87	5.5297 975	86.281 857	15.603 08	5.5913 960	87.455 161	15.641 03
34	5.6957 583	89.443 016	15.703 44	5.8239 223	91.884 233	15.777 04	5.8907 742	93.157 604	15.814 15
35	5.9947 856	95.138 774	15.870 25	6.1336 912	97.784 595	15.942 21	6.2061 820	99.165 371	15.978 48
36	6.3095 119	101.13 356	16.028 75	6.4599 365	103.99 879	16.099 04	6.5384 775	105.49 481	16.134 47
37	6.6407 613	107.44 307	16.179 33	6.8035 345	110.54 351	16.247 95	6.8885 651	112.16 314	16.282 51
38	6.9894 012	114.08 383	16.322 40	7.1654 081	117.43 634	16.389 34	7.2573 972	119.18 852	16.423 04
39	7.3563 448	121.07 323	16.458 34	7.5465 294	124.69 580	16.523 60	7.6459 776	126 59 005	16.556 42
40	7.7425 529	128.42 958	16.587 50	7.9479 223	132.34 138	16.651 07	8.0553 636	134.38 788	16.683 03
41	8.1490 369	136.17 213	16.710 21	8.3706 648	140.39 361	16.772 10	8.4856 693	142.60 322	16.803 20
42	8.5768 613	144.32 117	16.826 80	8.8158 926	148.87 414	16.887 02	8.9410 682	151.25 844	16.917 27
43	9.0271 466	152.89 803	16.937 58	9.2848 017	157.80 575	16.996 14	9.4197 969	160.37 708	17.025 54
44	9.5010 718	161.92 518	17.042 83	9.7786 516	167.21 241	17.099 74	9.9241 579	169.98 396	17.128 30
45	9.9998 780	171.42 625	17.142 83	10.298 769	177.11 941	17.198 12	10.455 524	180.10 522	17.225 84
46	10.524 872	181.42 613	17.237 85	10.846 551	187.55 335	17.291 52	11.015 340	190.76 839	17.318 43
47	11.077 427	191.95 100	17.328 42	11.423 469	198.54 226	17.380 21	11.605 131	202.00 250	17.406 31
48	11.658 992	203.02 843	17.413 89	12.031 072	210.11 566	17.464 42	12.226 501	213.83 811	17.489 72
49	12.271 089	214.68 742	17.495 38	12.670 994	222.30 464	17.544 37	12.881 140	226.30 741	17.568 89
50	12.915 322	226.95 851	17.572 81	13.344 952	235.14 194	17.620 29	13.570 831	239.44 440	17.644 05
51	13.593 376	239.87 383	17.646 38	14.054 757	248.66 205	17.692 38	14.297 449	253.28 475	17.715 39
52	14.307 028	253.46 720	17.716 27	14.802 317	262.90 127	17.760 82	15.062 973	267.86 615	17.783 09
53	15.058 147	267.77 423	17.782 68	15.589 638	277.89 787	17.825 81	15.869 485	283.22 828	17.847 35
54	15.848 700	282.83 238	17 845 78	16.418 836	293.69 212	17.887 51	16.719 179	299.41 294	17.908 35
55	16.680 757	298.68 108	17.905 73	17.292 139	310.32 645	17.946 10	17.614 369	316.46 417	17.966 25
56	17.556 496	315.36 184	17.962 69	18.211 892	327.84 555	18.001 73	18.557 489	334.42 836	18.021 21
57	18.478 212	332.91 833	18.016 80	19.180 565	346.29 647	18.054 55	19.551 106	353.35 441	18.073 37
58	19.448 319	351.39 655	18.068 22	20.200 761	365.72 878	18.104 70	20.597 925	373.29 381	18.122 88
59	20.469 355	370.84 486	18.117 08	21.276 221	386.19 468	18.152 32	21.700 793	394.30 081	18.169 88
60	21.543 997	391.31 422	18.163 49	22.406 830	407.74 914	18.197 54	22.862 711	416.43 259	18.214 49
61	22.675 056	412.85 822	18.207 59	23.598 628	430.45 006	18.240 47	24.086 842	439.74 936	18.256 83
62	23.865 497	435.53 327	18.249 50	24.853 817	454.35 842	18.281 23	25.376 515	464.31 458	18.297 01
63	25.118 435	459.39 877	18.289 31	26.175 768	479.53 844	18.319 94	26.735 242	490.19 508	18.335 16
64	26.437 153	484.51 720	18.327 13	27.568 033	506.05 777	18.356 69	28.166 718	517.46 129	18.371 37
65	27.825 104	510.95 436	18.363 07	29.034 351	533.98 763	18.391 58	29.674 839	546.18 741	18.405 74
66	29.285 922	538.77 946	18.397 22	30.578 660	563.40 306	18.424 71	31.263 709	576.45 160	18.438 36
67	30.823 433	568.06 538	18.429 66	32.205 111	594.38 306	18.456 17	32.937 651	608.33 622	18.469 33
68	32.441 663	598.88 882	18.460 48	33.918 070	627.01 086	18.486 04	34.701 221	641.92 802	18.498 71
69	34 144 850	631.33 048	18.489 77	35.722 141	661.37 411	18.514 40	36.559 217	677.31 742	18.526 60
70	35.937 455	665.47 533	18.517 60	37.622 168	697.56 510	18.541 33	38.516 695	714.60 371	18.553 09
71	37.824 171	701.41 278	18.544 04	39.623 256	735.68 106	18.566 90	40.578 982	753.88 536	18.578 22
72	39.809 940	739.23 696	18.569 15	41.730 780	775.82 437	18.591 18	42.751 688	795.27 026	18.602 08
73	41.899 962	779.04 690	18.593 02	43.950 401	818.10 287	18.614 23	45.040 728	838.87 101	18.624 72
74	44.099 710	820.94 686	18.615 70	46.288 081	862.63 012	18.636 12	47.452 329	884.80 626	18.646 21
75	46.414 945	865.04 657	18.637 24	48.750 101	909.52 573	18.656 90	49.993 053	933.20 101	18.666 61
76	48.851 729	911.46 151	18.657 71	51.343 073	958.91 568	18.676 63	52.669 814	984.18 694	18.685 98
77	51.416 445	960.31 324	18.677 16	54.073 963	1010.9 326	18.695 37	55.489 897	1037.9 028	18.704 36
78	54.115 809	1011.7 297	18.695 64	56.950 106	1065.7 163	18.713 16	58.460 974	1094.4 947	18.721 80
79	56.956 888	1065.8 455	18.713 20	59.979 229	1123.4 139	18.730 05	61.591 130	1154.1 168	18.738 36
80	59.947 125	1122.8 024	18.729 88	63.169 468	1184.1 803	18.746 09	64.888 884	1216.9 311	18.754 08
81	63.094 349	1182.7 495	18.745 73	66.529 393	1248.1 789	18.761 32	68.363 207	1283.1 087	18.769 00
82	66.406 803	1245.8 439	18.760 79	70.068 029	1315.5 815	18.775 78	72.023 556	1352.8 296	18.783 15
83	69.893 160	1312.2 507	18.775 09	73.794 882	1386.5 692	18.789 50	75.879 889	1426.2 836	18.796 58
84	73.562 551	1382.1 438	18.788 69	77.719 962	1461.3 326	18.802 51	79.942 701	1503.6 705	18.809 35
85	77.424 584	1455.7 064	18.801 60	81.853 814	1540.0 727	18.814 91	84.223 046	1585.2 009	18.821 46
86	81.489 375	1533.1 310	18.813 88	86.207 542	1623.0 008	18.826 67	88.732 573	1671.0 966	18.832 96
87	85.767 567	1614.6 203	18.825 54	90.792 840	1710.3 398	18.837 82	93.483 551	1761.5 915	18.843 86
88	90.270 365	1700.3 879	18.836 61	95.622 026	1802.3 243	18.848 42	98.488 910	1856.9 316	18.854 22
89	95.009 559	1790.6 583	18.847 14	100.70 807	1899.2 014	18.858 48	103.76 223	1957.3 766	18.864 05
90	99.997 561	1885.6 678	18.857 14	106.06 464	2001.2 312	18.868 03	109.31 798	2063.1 996	18.873 38
91	105.24 743	1985.6 654	18.866 64	111.70 612	2108.6 880	18.877 10	115.17 115	2174.6 886	18.882 25
92	110.77 292	2090.9 128	18.875 67	117.64 766	2221.8 602	18.885 72	121.33 772	2292.1 471	18.890 64
93	116.58 850	2201.6 857	18.884 24	123.90 523	2341.0 520	18.893 89	127.83 447	2415.8 947	18.898 62
94	122.70 940	2318.2 742	18.892 39	130.49 563	2466.5 835	18.901 67	134.67 907	2546.2 680	18.906 19
95	129.15 164	2440.9 836	18.900 14	137.43 658	2598.7 919	18.909 03	141.89 015	2683.6 218	18.913 38
96	135.93 210	2570.1 353	18.907 49	144.74 670	2738.0 323	18.916 03	149.48 732	2828.3 299	18.920 20
97	143.06 854	2706.0 674	18.914 48	152.44 564	2884.6 788	18.922 67	157.49 127	2980.7 801	18.926 68
98	150.57 964	2849.1 359	18.921 12	160.55 408	3039.1 253	18.928 98	165.92 377	3141.4 052	18.932 82
99	158.48 507	2999.7 156	18.927 43	169.09 380	3201.7 867	18.934 97	174.80 778	3310.6 243	18.938 65
100	166.80 553	3158.2 006	18.933 43	178.08 774	3373.0 998	18.940 66	184.16 745	3488.9 038	18.944 19
	Value of Perpetual Ann.		19.047 62	- - - - - - - - - -		19.047 62	- - - - - - - - - -		19.047 62

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0525.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02625.			RATIO *of* INTEREST: *QUARTERLY*, 0.013125.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.2643 780	0.0188 682	0.0713 682	0.2599 173	0.0184 380	0.0709 380	0.2576 586	0.0182 222	0.0707 222
27	0.2511 905	0.0176 113	0.0701 113	0.2467 907	0.0172 017	0.0697 017	0.2445 640	0.0169 963	0.0694 963
28	0.2386 608	0.0164 574	0.0689 574	0.2343 271	0.0160 671	0.0685 671	0.2321 349	0.0158 714	0.0683 714
29	0.2267 561	0.0153 958	0.0678 958	0.2224 929	0.0150 235	0.0675 235	0.2203 374	0.0148 368	0.0673 368
30	0.2154 452	0.0144 169	0.0669 169	0.2112 564	0.0140 616	0.0665 616	0.2091 395	0.0138 834	0.0663 834
31	0.2046 986	0.0135 127	0.0660 127	0.2005 873	0.0131 732	0.0656 732	0.1985 107	0.0130 031	0.0655 031
32	0.1944 879	0.0126 759	0.0651 759	0.1904 571	0.0123 514	0.0648 514	0.1884 221	0.0121 888	0.0646 888
33	0.1847 866	0.0119 003	0.0644 003	0.1808 385	0.0115 899	0.0640 899	0.1788 462	0.0114 344	0.0639 344
34	0.1755 693	0.0111 803	0.0636 803	0.1717 056	0.0108 833	0.0633 833	0.1697 570	0.0107 345	0.0632 345
35	0.1668 116	0.0105 110	0.0630 110	0.1630 339	0.0102 266	0.0627 266	0.1611 297	0.0100 842	0.0625 842
36	0.1584 909	0.0098 879	0.0623 879	0.1548 003	0.0096 155	0.0621 155	0.1529 408	0.0094 791	0.0619 791
37	0.1505 851	0.0093 073	0.0618 073	0.1469 824	0.0090 462	0.0615 462	0.1451 681	0.0089 156	0.0614 156
38	0.1430 738	0.0087 655	0.0612 655	0.1395 594	0.0085 153	0.0610 153	0.1377 904	0.0083 901	0.0608 901
39	0.1359 371	0.0082 593	0.0607 593	0.1325 112	0.0080 195	0.0605 195	0.1307 877	0.0078 995	0.0603 995
40	0.1291 564	0.0077 864	0.0602 864	0.1258 190	0.0075 562	0.0600 562	0.1241 409	0.0074 411	0.0599 411
41	0.1227 139	0.0073 436	0.0598 436	0.1194 648	0.0071 228	0.0596 228	0.1178 319	0.0070 125	0.0595 125
42	0.1165 927	0.0069 290	0.0594 290	0.1134 315	0.0067 171	0.0592 171	0.1118 434	0.0066 112	0.0591 112
43	0.1107 770	0.0065 403	0.0590 403	0.1077 029	0.0063 369	0.0588 369	0.1061 594	0.0062 353	0.0587 353
44	0.1052 513	0.0061 757	0.0586 757	0.1022 636	0.0059 805	0.0584 805	0.1007 642	0.0058 829	0.0583 829
45	0.1000 012	0.0058 334	0.0583 334	0.0970 990	0.0056 459	0.0581 459	0.0956 432	0.0055 523	0.0580 523
46	0.0950 130	0.0055 119	0.0580 119	0.0921 952	0.0053 318	0.0578 318	0.0907 825	0.0052 420	0.0577 420
47	0.0902 737	0.0052 097	0.0577 097	0.0875 391	0.0050 367	0.0575 367	0.0861 688	0.0049 504	0.0574 504
48	0.0857 707	0.0049 254	0.0574 254	0.0831 181	0.0047 593	0.0572 593	0.0817 895	0.0046 764	0.0571 764
49	0.0814 924	0.0046 579	0.0571 579	0.0789 204	0.0044 983	0.0569 983	0.0776 329	0.0044 188	0.0569 188
50	0.0774 274	0.0044 061	0.0569 061	0.0749 347	0.0042 528	0.0567 528	0.0736 875	0.0041 763	0.0566 763
51	0.0735 652	0.0041 689	0.0566 689	0.0711 503	0.0040 215	0.0565 215	0.0699 425	0.0039 481	0.0564 481
52	0.0698 957	0.0039 453	0.0564 453	0.0675 570	0.0038 037	0.0563 037	0.0663 880	0.0037 332	0.0562 332
53	0.0664 092	0.0037 345	0.0562 345	0.0641 452	0.0035 984	0.0560 984	0.0630 140	0.0035 307	0.0560 307
54	0.0630 967	0.0035 357	0.0560 357	0.0609 057	0.0034 049	0.0559 049	0.0598 115	0.0033 399	0.0558 399
55	0.0599 493	0.0033 481	0.0558 481	0.0578 297	0.0032 224	0.0557 224	0.0567 718	0.0031 599	0.0556 599
56	0.0569 590	0.0031 710	0.0556 710	0.0549 092	0.0030 502	0.0555 502	0.0538 866	0.0029 902	0.0554 902
57	0.0541 178	0.0030 037	0.0555 037	0.0521 361	0.0028 877	0.0553 877	0.0511 480	0.0028 300	0.0553 300
58	0.0514 183	0.0028 458	0.0553 458	0.0495 031	0.0027 343	0.0552 343	0.0485 486	0.0026 789	0.0551 789
59	0.0488 535	0.0026 965	0.0551 965	0.0470 030	0.0025 894	0.0550 894	0.0460 813	0.0025 361	0.0550 361
60	0.0464 166	0.0025 555	0.0550 555	0.0446 292	0.0024 525	0.0549 525	0.0437 393	0.0024 013	0.0549 013
61	0.0441 013	0.0024 221	0.0549 221	0.0423 753	0.0023 231	0.0548 231	0.0415 164	0.0022 740	0.0547 740
62	0.0419 015	0.0022 960	0.0547 960	0.0402 353	0.0022 009	0.0547 009	0.0394 065	0.0021 537	0.0546 537
63	0.0398 114	0.0021 768	0.0546 768	0.0382 033	0.0020 853	0.0545 853	0.0374 038	0.0020 400	0.0545 400
64	0.0378 256	0.0020 639	0.0545 639	0.0362 739	0.0019 761	0.0544 761	0.0355 029	0.0019 325	0.0544 325
65	0.0359 388	0.0019 571	0.0544 571	0.0344 420	0.0018 727	0.0543 727	0.0336 986	0.0018 309	0.0543 309
66	0.0341 461	0.0018 560	0.0543 560	0.0327 025	0.0017 749	0.0542 749	0.0319 860	0.0017 348	0.0542 348
67	0.0324 429	0.0017 604	0.0542 604	0.0310 510	0.0016 824	0.0541 824	0.0303 604	0.0016 438	0.0541 438
68	0.0308 246	0.0016 698	0.0541 698	0.0294 828	0.0015 949	0.0540 949	0.0288 174	0.0015 578	0.0540 578
69	0.0292 870	0.0015 840	0.0540 840	0.0279 938	0.0015 120	0.0540 120	0.0273 529	0.0014 764	0.0539 764
70	0.0278 261	0.0015 027	0.0540 027	0.0265 801	0.0014 336	0.0539 336	0.0259 628	0.0013 994	0.0538 994
71	0.0264 381	0.0014 257	0.0539 257	0.0252 377	0.0013 593	0.0538 593	0.0246 433	0.0013 265	0.0538 265
72	0.0251 194	0.0013 527	0.0538 527	0.0239 631	0.0012 890	0.0537 890	0.0233 909	0.0012 574	0.0537 574
73	0.0238 664	0.0012 836	0.0537 836	0.0227 529	0.0012 223	0.0537 223	0.0222 021	0.0011 921	0.0536 921
74	0.0226 759	0.0012 181	0.0537 181	0.0216 038	0.0011 592	0.0536 592	0.0210 738	0.0011 302	0.0536 302
75	0.0215 448	0.0011 560	0.0536 560	0.0205 128	0.0010 995	0.0535 995	0 0200 028	0.0010 716	0.0535 716
76	0.0204 701	0.0010 971	0.0535 971	0.0194 768	0.0010 428	0.0535 428	0.0189 862	0.0010 161	0.0535 161
77	0.0194 490	0.0010 413	0.0535 413	0.0184 932	0.0009 892	0.0534 892	0.0180 213	0.0009 635	0.0534 635
78	0.0184 789	0.0009 884	0.0534 884	0.0175 592	0.0009 383	0.0534 383	0.0171 054	0.0009 137	0.0534 137
79	0.0175 571	0.0009 382	0.0534 382	0.0166 724	0.0008 901	0.0533 901	0.0162 361	0.0008 665	0.0533 665
80	0.0166 814	0.0008 906	0.0533 906	0.0158 304	0.0008 445	0.0533 445	0.0154 110	0.0008 217	0.0533 217
81	0.0158 493	0.0008 455	0.0533 455	0.0150 309	0.0008 012	0.0533 012	0.0146 278	0.0007 794	0.0532 794
82	0.0150 587	0.0008 027	0.0533 027	0.0142 718	0.0007 601	0.0532 601	0.0138 843	0.0007 392	0.0532 392
83	0.0143 076	0.0007 620	0.0532 620	0.0135 511	0.0007 212	0.0532 212	0.0131 787	0.0007 011	0.0532 011
84	0.0135 939	0.0007 235	0.0532 235	0.0128 667	0.0006 843	0.0531 843	0.0125 090	0.0006 650	0.0531 650
85	0.0129 158	0.0006 870	0.0531 870	0.0122 169	0.0006 493	0.0531 493	0.0118 732	0.0006 308	0.0531 308
86	0.0122 715	0.0006 523	0.0531 523	0.0115 999	0.0006 161	0.0531 161	0.0112 698	0.0005 984	0.0530 984
87	0.0116 594	0.0006 193	0.0531 193	0.0110 141	0.0005 847	0.0530 847	0.0106 971	0.0005 677	0.0530 677
88	0.0110 778	0.0005 881	0.0530 881	0.0104 578	0.0005 548	0.0530 548	0.0101 534	0.0005 384	0.0530 384
89	0.0105 253	0.0005 585	0.0530 585	0.0099 297	0.0005 265	0.0530 265	0.0096 374	0.0005 109	0.0530 109
90	0.0100 002	0.0005 303	0.0530 303	0.0094 282	0.0004 997	0.0529 997	0.0091 476	0.0004 847	0.0529 847
91	0.0095 014	0.0005 036	0.0530 036	0.0089 521	0.0004 742	0.0529 742	0.0086 827	0.0004 598	0.0529 598
92	0.0090 275	0.0004 783	0.0529 783	0.0085 000	0.0004 501	0.0529 501	0.0082 415	0.0004 363	0.0529 363
93	0.0085 772	0.0004 542	0.0529 542	0.0080 707	0.0004 272	0.0529 272	0.0078 226	0.0004 139	0.0529 139
94	0.0081 493	0.0004 314	0.0529 314	0.0076 631	0.0004 054	0.0529 054	0.0074 251	0.0003 927	0.0528 927
95	0.0077 428	0.0004 097	0.0529 097	0.0072 761	0.0003 848	0.0528 848	0.0070 477	0.0003 726	0.0528 726
96	0.0073 566	0.0003 891	0.0528 891	0.0069 086	0.0003 652	0.0528 652	0.0066 895	0.0003 536	0.0528 536
97	0.0069 897	0.0003 695	0.0528 695	0.0065 597	0.0003 467	0.0528 467	0.0063 496	0.0003 355	0.0528 355
98	0.0066 410	0.0003 510	0.0528 510	0.0062 284	0.0003 290	0.0528 290	0.0060 269	0.0003 183	0.0528 183
99	0.0063 097	0.0003 334	0.0528 334	0.0059 139	0.0003 123	0.0528 123	0.0057 206	0.0003 021	0.0528 021
100	0.0059 950	0.0003 166	0.0528 166	0.0056 152	0.0002 966	0.0527 966	0.0054 298	0.0002 866	0.0527 866
	Ratio of Perpetual Ann.		0.0525 000	. . . .		0.0525 000	. . . .		0.0525 000

RATE of INTEREST: 5½ *per Cent. per Ann.*——CORRESPONDING VALUE of

Year.	RATIO *of* INTEREST: *ANNUALLY*, 0.055.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.0275.			RATIO *of* INTEREST: *QUARTERLY*, 0.01375.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
¼	....	....	....	....	....	....	1.0137 500	0.2500 000	0.2466 09
½	....	....	....	1.0275 000	0.5000 000	0.4866 18	1.0276 891	0.5034 375	0.4898 73
¾	....	....	....	....	....	....	1.0418 198	0.7603 598	0.7298 38
1	1.0550 000	1.0000 000	0.9478 67	1.0557 563	1.0137 500	0.9602 12	1.0561 448	1.0208 147	0.9665 48
¼	....	....	....	....	....	....	1.0706 668	1.2848 509	1.2000 47
½	....	....	....	1.0847 895	1.5416 281	1.4211 31	1.0853 885	1.5525 176	1.4303 80
¾	....	....	....	....	....	....	1.1003 126	1.8238 647	1.6575 88
2	1.1130 250	2.0550 000	1.8463 20	1.1146 213	2.0840 229	1.8697 14	1.1154 419	2.0989 429	1.8817 14
¼	....	....	....	....	....	....	1.1307 792	2.3778 033	2.1028 01
½	....	....	....	1.1452 733	2.6413 335	2.3062 91	1.1463 274	2.6604 981	2.3208 89
¾	....	....	....	....	....	....	1.1620 894	2.9470 800	2.5360 18
3	1.1742 414	3.1680 250	2.6979 33	1.1767 684	3.2139 702	2.7311 83	1.1780 681	3.2376 023	2.7482 30
¼	....	....	....	....	....	....	1.1942 666	3.5321 194	2.9575 64
½	....	....	....	1.2091 295	3.8023 544	3.1447 04	1.2106 877	3.8306 860	3.1640 58
¾	....	....	....	....	....	....	1.2273 347	4.1333 579	3.3677 51
4	1.2388 247	4.3422 664	3.5051 50	1.2423 806	4.4069 191	3.5471 57	1.2442 105	4.4401 916	3.5686 82
¼	....	....	....	....	....	....	1.2613 184	4.7512 442	3.7668 87
½	....	....	....	1.2765 460	5.0281 094	3.9388 39	1.2786 616	5.0665 739	3.9624 04
¾	....	....	....	....	....	....	1.2962 432	5.3862 392	4.1552 69
5	1.3069 600	5.5810 910	4.2702 84	1.3116 510	5.6663 824	4.3200 38	1.3140 665	5.7103 000	4.3455 18
¼	....	....	....	....	....	....	1.3321 349	6.0388 167	4.5331 87
½	....	....	....	1.3477 214	6.3222 079	4.6910 35	1.3504 518	6.3718 504	4.7183 10
¾	....	....	....	....	....	....	1.3690 205	6.7094 633	4.9009 23
6	1.3788 428	6.8880 510	4.9955 30	1.3847 838	6.9960 686	5.0521 02	1.3878 445	7.0517 185	5.0810 58
¼	....	....	....	....	....	....	1.4069 274	7.3986 796	5.2567 50
½	....	....	....	1.4228 653	7.6684 605	5.4035 05	1.4262 726	7.7504 114	5.4340 32
¾	....	....	....	....	....	....	1.4458 839	8.1069 796	5.6069 37
7	1.4546 792	8.2668 938	5.6829 67	1.4619 941	8.3998 932	5.7455 04	1.4657 648	8.4664 505	5.7774 96
¼	....	....	....	....	....	....	1.4859 190	8.8348 917	5.9467 42
½	....	....	....	1.5021 990	9.1308 903	6.0783 49	1.5063 504	9.2063 715	6.1117 06
¾	....	....	....	....	....	....	1.5270 628	9.5829 591	6.2754 19
8	1.5346 865	9.7215 730	6.3345 66	1.5435 094	9.8819 897	6.4022 87	1.5480 599	9.9647 248	6.4369 12
¼	....	....	....	....	....	....	1.5693 457	10.351 740	6.5962 14
½	....	....	....	1.5859 559	10.653 744	6.7175 54	1.5909 242	10.744 076	6.7533 55
¾	....	....	....	....	....	....	1.6127 994	11.141 807	6.9083 65
9	1.6190 943	11.256 260	6.9521 95	1.6295 697	11.446 722	7.0243 83	1.6349 754	11.545 007	7.0612 73
¼	....	....	....	....	....	....	1.6574 563	11.953 751	7.2121 06
½	....	....	....	1.6743 829	12.261 507	7.3230 01	1.6802 463	12.368 115	7.3608 94
¾	....	....	....	....	....	....	1.7033 497	12.788 177	7.5076 64
10	1.7081 445	12.875 354	7.5376 26	1.7204 284	13.098 699	7.6136 26	1.7267 708	13.214 014	7.6624 42
¼	....	....	....	....	....	....	1.7505 139	13.645 707	7.7952 58
½	....	....	....	1.7677 402	13.958 913	7.8964 73	1.7745 834	14.083 335	7.9361 36
¾	....	....	....	....	....	....	1.7989 840	14.526 981	8.0751 03
11	1.8020 924	14.583 498	8.0925 36	1.8163 531	14.842 783	8.1717 50	1.8237 200	14.976 727	8.2121 86
¼	....	....	....	....	....	....	1.8487 961	15.432 657	8.3474 09
½	....	....	....	1.8663 028	15.750 960	8.4396 59	1.8742 171	15.894 856	8.4807 98
¾	....	....	....	....	....	....	1.8999 876	16.363 410	8.6123 78
12	1.9012 075	16.385 591	8.6185 18	1.9176 261	16.684 111	8.7003 98	1.9261 124	16.838 407	8.7421 73
¼	....	....	....	....	....	....	1.9525 964	17.319 935	8.8702 07
½	....	....	....	1.9703 608	17.642 924	8.9541 59	1.9794 446	17.808 084	8.9965 05
¾	....	....	....	....	....	....	2.0066 620	18.302 946	9.1219 90
13	2.0057 739	18.286 798	9.1170 78	2.0245 457	18.628 104	9.2011 28	2.0342 536	18.804 611	9.2439 86
¼	....	....	....	....	....	....	2.0622 246	19.313 174	9.3652 14
½	....	....	....	2.0802 208	19.640 377	9.4414 87	2.0905 802	19.828 731	9.4847 98
¾	....	....	....	....	....	....	2.1193 257	20.351 376	9.6027 60
14	2.1160 915	20.292 572	9.5896 48	2.1374 268	20.680 488	9.6754 13	2.1484 664	20.881 207	9.7191 22
¼	....	....	....	....	....	....	2.1780 078	21.418 324	9.8339 06
½	....	....	....	2.1962 061	21.749 201	9.9030 78	2.2079 554	21.962 826	9.9471 33
¾	....	....	....	....	....	....	2.2383 148	22.514 815	10.068 82
15	2.2324 765	22.408 663	10.037 58	2.2566 017	22.847 304	10.124 65	2.2690 916	23.074 393	10.169 00
¼	....	....	....	....	....	....	2.3002 916	23.641 666	10.277 68
½	....	....	....	2.3186 583	23.975 605	10.340 29	2.3319 206	24.216 739	10.384 69
¾	....	....	....	....	....	....	2.3639 846	24.799 719	10.490 64
16	2.3552 627	24.641 140	10.462 16	2.3824 214	25.134 934	10.550 16	2.3964 893	25.390 715	10.594 96
17	2.4848 021	26.996 403	10.864 61	2.5152 563	27.550 114	10.953 20	2.5310 398	27.837 087	10.998 28
18	2.6214 663	29.481 205	11.246 07	2.6554 975	30.099 955	11.334 96	2.6731 445	30.420 810	11.380 16
19	2.7656 469	32.102 671	11.607 65	2.8035 581	32.791 965	11.696 55	2.8232 277	33.149 595	11.741 74
20	2.9177 575	34.868 318	11.950 38	2.9598 740	35.634 072	12.039 05	2.9817 373	36.031 587	12.084 09
21	3.0782 342	37.786 076	12.275 24	3.1249 055	38.634 645	12.363 46	3.1491 464	39.075 388	12.408 25
22	3.2475 370	40.864 310	12.583 17	3.2991 385	41.802 518	12.670 74	3.3259 546	42.290 083	12.715 17
23	3.4261 516	44.111 847	12.875 04	3.4830 861	45.147 019	12.961 79	3.5126 897	45.685 257	13.005 78
24	3.6145 899	47.537 998	13.151 70	3.6772 899	48.677 998	13.237 46	3.7099 090	49.271 072	13.280 94
25	3.8133 923	51.152 588	13.413 93	3.8823 218	52.405 850	13.498 58	3.9182 011	53.058 202	13.541 47

PERPETUAL STOCK : 3 *p. C.* 54,5455; 3½ *p. C.* 63,6364; 4 *p. C.* 72,7273; 5 *p. C.* 90,9091.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.055.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.0275.			RATIO *of* INTEREST: *QUARTERLY*, 0.01375.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
¼	....	....	....	....	....	....	0.9864 365	4.0000 000	4.0550 000
½	....	....	....	0.9732 360	2.0000 000	2.0550 000	0.9730 570	1.9863 440	2.0413 440
¾	....	....	....	....	....	....	0.9598 589	1.3151 668	1.3701 668
1	0.9478 673	1.0000 000	1.0550 000	0.9471 883	0.9864 365	1.0414 365	0.9468 398	0.9796 097	1.0346 097
¼	....	....	....	....	....	....	0.9339 974	0.7783 005	0.8333 005
½	....	....	....	0.9218 378	0.6486 649	0.7036 649	0.9213 291	0.6441 151	0.6991 151
¾	....	....	....	....	....	....	0 9088 326	0.5482 863	0.6032 863
2	0.8984 524	0.4866 180	0.5416 180	0.8971 658	0.4798 412	0.5348 412	0.8965 058	0.4764 304	0.5314 304
¼	....	....	....	....	....	....	0.8843 459	0.4205 562	0.4755 562
½	....	....	....	0.8731 540	0.3785 966	0.4335 966	0.8723 511	0.3758 695	0.4308 695
¾	....	....	....	....	....	....	0.8605 190	0.3393 189	0.3943 189
3	0.8516 136	0.3156 541	0.3706 541	0.8497 849	0.3111 417	0.3661 417	0.8488 473	0.3088 705	0.3638 705
¼	....	....	....	....	....	....	0.8373 340	0.2831 161	0.3381 161
½	....	....	....	0.8270 413	0.2629 950	0.3179 950	0.8259 768	0.2610 499	0.3160 499
¾	....	....	....	....	....	....	0.8147 737	0.2419 340	0.2969 340
4	0.8072 167	0.2302 945	0.2852 945	0.8049 064	0.2269 159	0.2819 159	0.8037 225	0.2252 155	0.2802 155
¼	....	....	....	....	....	....	0.7928 212	0.2104 712	0.2654 712
½	....	....	....	0.7833 639	0.1988 819	0.2538 819	0.7820 678	0 1973 721	0.2523 721
¾	....	....	....	....	....	....	0.7714 602	0.1856 583	0.2406 583
5	0.7651 344	0.1791 764	0.2341 764	0.7623 979	0.1764 794	0.2314 794	0.7609 965	0.1751 222	0.2301 222
¼	....	....	....	....	....	....	0.7506 747	0.1655 954	0.2205 954
½	....	....	....	0.7419 931	0.1581 726	0.2131 726	0.7404 929	0.1569 403	0.2119 403
¾	....	....	....	....	....	....	0.7304 493	0.1490 432	0.2040 432
6	0.7252 458	0.1451 790	0.2001 790	0.7221 344	0.1429 374	0.1979 374	0.7205 418	0.1418 094	0.1968 094
¼	....	....	....	....	....	....	0.7107 667	0 1351 593	0.1901 593
½	....	....	....	0.7028 072	0.1300 651	0.1850 651	0.7011 282	0.1290 254	0.1840 254
¾	....	....	....	....	....	....	0.6916 185	0.1233 505	0.1783 505
7	0.6874 368	0.1209 644	0.1759 644	0.6839 972	0.1190 491	0.1740 491	0.6822 377	0.1180 854	0.1730 854
¼	....	....	....	....	....	....	0.6729 842	0.1131 876	0.1681 876
½	....	....	....	0.6656 908	0.1095 183	0.1645 183	0.6638 561	0.1086 204	0.1636 204
¾	....	....	....	....	....	....	0.6548 519	0.1043 519	0.1593.519
8	0.6515 989	0.1028 640	0.1578 640	0.6478 742	0.1011 942	0.1561 942	0.6459 699	0.1003 540	0.1553 540
¼	....	....	....	....	....	....	0.6372 082	0.0966 021	0.1516 021
½	....	....	....	0.6305 345	0.0938 628	0.1488 628	0.6285 655	0.0930 745	0.1480 745
¾	....	....	....	....	....	....	0.6200 399	0.0897 520	0.1447 520
9	0.6176 291	0.0888 395	0.1438 395	0.6136 589	0.0873 613	0.1423 613	0.6116 300	0.0866 175	0.1416 175
¼	....	....	....	....	....	....	0.6033 342	0.0836 557	0.1386 557
½	....	....	....	0.5972 350	0.0815 560	0.1365 560	0.5951 509	0.0808 531	0.1358 531
¾	....	....	....	....	....	....	0.5870 785	0.0781 972	0.1331 972
10	0.5854 306	0.0776 678	0.1326 678	0.5812 505	0.0763 435	0.1313 435	0.5791 156	0.0756 772	0.1306 772
¼	....	....	....	....	....	....	0.5712 608	0.0732 831	0.1282 831
½	....	....	....	0.5656 940	0.0716 388	0.1266 388	0.5635 126	0.0710 059	0.1260 059
¾	....	....	....	....	....	....	0.5558 693	0.0688 374	0.1238 374
11	0.5549 105	0.0685 707	0.1235 707	0.5505 537	0.0673 728	0.1223 728	0.5483 298	0.0667 703	0.1217 703
¼	....	....	....	....	....	....	0.5408 925	0.0647 977	0.1197 977
½	....	....	....	0.5358 188	0.0634 882	0.1184 882	0.5335 561	0.0629 134	0.1179 134
¾	....	....	....	....	....	....	0.5263 192	0.0611 120	0.1161 120
12	0.5259 815	0.0610 292	0.1160 292	0.5214 781	0.0599 373	0.1149 373	0.5191 805	0.0593 880	0.1143 880
¼	....	....	....	....	....	....	0.5121 386	0.0577 368	0.1127 368
½	....	....	....	0.5075 212	0.0566 800	0.1116 800	0.5051 922	0.0561 543	0.1111 543
¾	....	....	....	....	....	....	0.4983 400	0.0546 360	0.1096 360
13	0.4985 607	0.0546 843	0.1096 843	0.4939 380	0.0536 823	0.1086 823	0.4915 808	0.0531 784	0.1081 784
¼	....	....	....	....	....	....	0.4849 133	0.0517 781	0.1067 781
½	....	....	....	0.4807 188	0.0509 155	0.1059 155	0.4783 361	0.0504 319	0.1054 319
¾	....	....	....	....	....	....	0.4718 482	0.0491 367	0.1041 367
14	0.4725 694	0.0492 791	0.1042 791	0.4678 523	0.0483 548	0.1033 548	0.4654 483	0.0478 900	0.1028 900
¼	....	....	....	....	....	....	0.4591 352	0.0466 890	0.1016 890
½	....	....	....	0.4553 307	0.0459 787	0.1009 787	0.4529 077	0.0455 315	0.1005 315
¾	....	....	....	....	....	....	0.4467 647	0.0444 152	0.0994 152
15	0.4479 330	0.0446 256	0.0996 256	0.4431 442	0.0437 688	0.0987 688	0.4407 050	0.0433 381	0.0983 381
¼	....	....	....	....	....	....	0.4347 275	0.0422 982	0.0972 982
½	....	....	....	0.4312 839	0.0417 091	0.0967 091	0.4288 312	0.0412 937	0.0962 937
¾	....	....	....	....	....	....	0.4230 146	0.0403 230	0.0953 230
16	0.4245 811	0.0405 825	0.0955 825	0.4197 410	0.0397 853	0.0947 853	0.4172 770	0,0393 845	0.0943 845
17	0.4024 465	0.0370 480	0.0920 480	0.3975 738	0.0362 975	0.0912 975	0.3950 945	0.0359 233	0.0909 233
18	0.3814 659	0.0339 200	0.0889 200	0.3765 773	0.0332 226	0.0882 226	0.3740 913	0.0328 722	0.0878 722
19	0.3615 791	0.0311 501	0.0861 501	0.3566 896	0.0304 953	0.0854 953	0.3542 045	0.0301 663	0.0851 663
20	0.3427 290	0.0286 793	0.0836 793	0.3378 522	0.0280 630	0.0830 630	0.3353 749	0.0277 534	0.0827 534
21	0.3248 616	0.0264 648	0.0814 648	0.3200 097	0.0258 835	0.0808 835	0.3175 464	0.0255 916	0.0805 916
22	0.3079 257	0.0244 712	0.0794 712	0.3031 094	0.0239 220	0.0789 220	0.3006 656	0.0236 462	0.0786 462
23	0.2918 727	0.0226 696	0.0776 696	0.2871 017	0.0221 499	0.0771 499	0.2846 821	0.0218 889	0.0768 889
24	0.2766 565	0.0210 358	0.0760 358	0.2719 394	0.0205 432	0.0755 432	0.2695 484	0.0202 959	0.0752 959
25	0.2622 337	0.0195 494	0.0745 494	0.2575 778	0.0190 818	0.0740 818	0.2552 192	0.0188 472	0.0738 472

RATE OF INTEREST: 5½ *per Cent. per Ann.*——CORRESPONDING VALUE OF

Years.	RATIO of INTEREST: *ANNUALLY*, 0.055.			RATIO of INTEREST: *HALF-YEARLY*, 0.0275.			RATIO of INTEREST: *QUARTERLY*, 0.01375.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	4.0231 289	54.965 981	13.662 50	4.0987 855	56.341 554	13.745 92	4.1381 878	57.057 959	13.788 15
27	4.2444 010	58.989 109	13.898 10	4.3273 184	60.496 698	13.980 18	4.3705 255	61.282 282	14.021 72
28	4.4778 431	63.233 510	14.121 42	4.5685 934	64.883 517	14.202 08	4.6159 078	65.743 779	14.248 87
29	4.7241 244	67.711 354	14.333 10	4.8233 211	69.514 928	14.412 25	4.8750 671	70.455 765	14.452 26
30	4.9839 513	72.435 478	14.533 74	5.0922 514	74.404 570	14.611 33	5.1487 768	75.432 306	14.650 53
31	5.2580 686	77.419 429	14.723 93	5.3761 762	79.566 840	14.799 89	5.4378 539	80.688 253	14.838 25
32	5.5472 624	82.677 498	14.904 20	5.6759 316	85.016 939	14.978 50	5.7431 612	86.239 294	15.016 00
33	5.8523 618	88.224 760	15.075 07	5.9924 003	90.770 914	15.147 67	6.0656 099	92.101 997	15.184 29
34	6.1742 417	94.077 122	15.237 03	6.3265 141	96.845 710	15.307 91	6.4061 624	98.293 861	15.343 64
35	6.5138 250	100.25 136	15.390 55	6.6792 568	103.25 921	15.459 69	6.7658 351	104.83 337	15.494 52
36	6.8720 864	106.76 519	15.536 07	7.0516 671	110.03 031	15.603 45	7.1457 017	111.74 003	15.637 38
37	7.2500 501	113.63 727	15.674 00	7.4448 416	117.17 894	15.739 62	7.5468 957	119.03 467	15.772 64
38	7.6488 028	120.88 732	15.804 74	7.8599 380	124.72 615	15.868 59	7.9706 147	126.73 845	15.900 71
39	8.0694 870	128.53 613	15.928 66	8.2981 787	132.69 416	15.990 76	8.4181 234	134.87 497	16.021 98
40	8.5133 088	136.60 561	16.046 12	8.7606 540	141.10 644	16.106 47	8.8907 573	143.46 831	16.136 80
41	8.9815 408	145.11 892	16.157 46	9.2493 264	149.98 775	16.216 07	9.3899 272	152.54 413	16.245 51
42	9.4755 255	154.10 046	16.263 00	9.7650 341	159.36 426	16.319 89	9.9171 228	162.12 951	16.348 44
43	9.9966 794	163.57 599	16.363 03	10.309 496	169.26 356	16.418 22	10.473 918	172.25 305	16.445 90
44	10.546 497	173.57 267	16.457 85	10.884 315	179.71 481	16.511 36	11.061 974	182.94 498	16.538 19
45	11.126 554	184.11 917	16.547 75	11.491 183	190.74 879	16.599 58	11.683 046	194.23 721	16.625 56
46	11.738 515	195.24 572	16.632 92	12.131 889	202.39 797	16.683 14	12.338 989	206.16 343	16.708 29
47	12.384 133	206.98 423	16.713 66	12.808 317	214.69 667	16.762 29	13.031 759	218.75 925	16.786 63
48	13.065 260	219.36 837	16.790 20	13.522 461	227.68 111	16.837 25	13.763 425	232.06 226	16.860 79
49	13.783 849	232.43 368	16.862 75	14.276 423	241.38 950	16.908 26	14.536 169	246.11 217	16.931 02
50	14.541 961	246.21 748	16.931 52	15.072 428	255.86 222	16.975 52	15.352 300	260.95 091	16.997 51
51	15.341 769	260.75 944	16.996 70	15.912 804	271.14 189	17.039 23	16.214 252	276.62 276	17.060 47
52	16.185 566	276.10 121	17.058 48	16.800 942	287.27 350	17.099 57	17.124 598	293.17 451	17.120 08
53	17.075 773	292.28 677	17.117 05	17.736 750	304.30 454	17.156 72	18.086 055	310.65 555	17.176 52
54	18.014 940	309.36 255	17.172 55	18.725 684	322.28 517	17.210 86	19.101 493	329.11 806	17.229 97
55	19.005 762	327.37 749	17.225 17	19.769 758	341.26 833	17.262 14	20.173 943	348.61 714	17.280 56
56	20.051 079	346.38 325	17.275 04	20.872 046	361.30 993	17.310 71	21.306 605	369.21 100	17.328 48
57	21.153 888	366.43 433	17.322 32	22.035 793	382.46 896	17.356 71	22.502 860	390.96 110	17.373 84
58	22.317 352	387.58 821	17.367 12	23.264 426	404.80 775	17.400 29	23.766 279	413.93 236	17.416 79
59	23.544 806	409.90 557	17.409 60	24.561 563	428.39 206	17.441 56	25.100 632	438.19 332	17.457 46
60	24.839 770	433.45 037	17.449 85	25.931 024	453.29 134	17.480 66	26.509 903	463.81 641	17.495 97
61	26.206 958	458.29 014	17.488 01	27.376 841	479.57 892	17.517 69	27.998 296	490.87 811	17.532 43
62	27.647 285	484.49 610	17.524 18	28.903 271	507.33 219	17.552 76	29.570 255	519.45 918	17.566 95
63	29.167 886	512.14 339	17.558 47	30.514 809	536.63 288	17.585 98	31.230 471	549.64 493	17.599 64
64	30.772 120	541.31 127	17.590 96	32.216 200	567.56 727	17.617 45	32.983 900	581.52 546	17.630 59
65	32.464 587	572.08 339	17.621 77	34.012 454	600.22 644	17.647 25	34.835 775	615.19 591	17.659 89
66	34.250 139	604.54 798	17.650 96	35.908 861	634.70 657	17.675 49	36.791 623	650.75 678	17.687 64
67	36.133 896	638.79 812	17.678 64	37.911 005	671.10 918	17.702 23	38.857 282	688.31 421	17.713 91
68	38.121 261	674.93 201	17 704 87	40.024 780	709.54 146	17.727 56	41.038 916	727.98 030	17.738 78
69	40.217 930	713.05 327	17.729 74	42.256 412	750.11 658	17.751 54	43.343 038	769.87 343	17.762 33
70	42.429 916	753.27 120	17.753 30	44.612 471	792.95 401	17.774 27	45.776 525	814.11 864	17.784 63
71	44.763 562	795.70 112	17.775 64	47.099 895	838.17 991	17.795 79	48.346 639	860.84 799	17.805 75
72	47.225 558	840.46 468	17.796 82	49.726 008	885.92 743	17.816 18	51.061 052	910.20 095	17.825 74
73	49.822 963	887.69 024	17.816 89	52.498 544	936.33 717	17.835 49	53.927 865	962.32 482	17.844 07
74	52.563 226	937.51 320	17.835 91	55.425 666	989.55 757	17.853 78	56.955 635	1017.3 752	17.862 59
75	55.454 204	990.07 643	17.853 95	58.515 993	1045.7 453	17.871 10	60.153 398	1075.5 163	17.879 56
76	58.504 185	1045.5 306	17.871 04	61.778 626	1105.0 659	17.887 51	63.530 699	1136.9 218	17.895 63
77	61.721 915	1104.0 348	17.887 24	65.223 170	1167.6 940	17.903 05	67.097 618	1201.7 749	17.910 84
78	65.116 620	1165.7 567	17.902 60	68.859 770	1233.8 140	17.917 78	70.864 801	1270.2 691	17.925 25
79	68.698 034	1230.8 734	17.917 16	72.699 132	1303.6 206	17.931 72	74.843 492	1342.6 089	17.938 89
80	72.476 426	1299.5 714	17.930 95	76.752 563	1377.3 193	17.944 93	79.045 565	1419.0 103	17.951 80
81	76.462 630	1372.0 478	17.944 03	81.031 998	1455.1 272	17.957 44	83.483 564	1499.7 012	17.964 03
82	80.668 074	1448.5 104	17.956 43	85.550 039	1537.2 734	17.969 29	88.170 732	1584.9 224	17.975 61
83	85.104 818	1529.1 785	17.968 18	90.319 988	1623.9 998	17.980 52	93.121 061	1674.9 284	17.986 57
84	89.785 583	1614.2 833	17 979 32	95.355 892	1715.5 617	17.991 14	98.349 325	1769.9 877	17.996 95
85	94.723 791	1704.0 689	17.989 87	100.67 258	1812.2 287	18.001 21	103.87 113	1870.3 842	18.006 78
86	99.933 599	1798.7 927	17.999 88	106.28 570	1914.2 855	18.010 75	109.70 295	1976.4 174	18.016 08
87	105.42 995	1898.7 263	18.009 36	112.21 180	2022.0 327	18.019 79	115.86 221	2088.4 037	18.024 89
88	111.22 859	2004.1 563	18.018 35	118.46 831	2135.7 874	18.028 34	122.36 727	2206.6 776	18.033 23
89	117.34 617	2115.3 848	18.026 88	125.07 365	2255.8 846	18.036 45	129.23 755	2331.5 919	18.041 13
90	123.80 021	2232.7 310	18.034 95	132.04 729	2382.6 780	18.044 13	136.49 357	2463.5 195	18.048 61
91	130.60 922	2356.5 312	18.042 61	139.40 975	2516.5 410	18.051 40	144.15 698	2602.8 541	18.055 69
92	137.79 272	2487.1 404	18.049 87	147.18 272	2657.8 676	18.058 29	152.25 064	2750.0 117	18.062 40
93	145.37 132	2624.9 332	18.056 75	155.38 908	2807.0 741	18.064 81	160.79 873	2905.4 344	18.068 75
94	153.36 675	2770.3 045	18.063 27	164.05 299	2964.5 998	18.070 99	169.82 674	3069.5 771	18.074 76
95	161.80 192	2923.6 712	18.069 45	173.19 997	3130.9 085	18.076 84	179.36 163	3242.9 387	18.080 46
96	170.70 102	3085.4 732	18.075 31	182.85 695	3306.4 900	18.082 39	189.43 186	3426.0 337	18.085 84
97	180.08 958	3256.1 742	18.080 86	193.05 236	3491.8 612	18.087 64	200.06 747	3619.4 085	18.090 94
98	189.99 451	3436.2 638	18.086 12	203.81 624	3687.5 680	18.092 61	211.30 022	3823.6 404	18.095 77
99	200.44 420	3626.2 583	18.091 11	215.18 027	3894.1 867	18.097 32	223.16 263	4039.3 387	18.100 35
100	211.46 864	3826.7 025	18.095 84	227.17 792	4112.3 257	18.101 78	235.69 311	4267.1 475	18.104 68
	Value of Perpetual Ann.		18.181 82	- - - - - -	- - - - - -	18.181 82	- - - - -	- - - - -	18.181 88

PERPETUAL STOCK: 3 *p.C.* 54,5455; 3½ *p.C.* 63,6364; 4 *p.C.* 72,7273; 5 *p.C.* 90,90

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.055.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.0275.			RATIO *of* INTEREST: *QUARTERLY*, 0.01375.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.2485 628	0.0181 931	0.0731 931	0.2439 747	0.0177 489	0.0727 489	0.2416 517	0.0175 260	0.0725 260
27	0.2356 045	0.0169 523	0.0719 523	0.2310 900	0.0165 298	0.0715 298	0.2288 054	0.0163 179	0.0713 179
28	0.2233 218	0.0158 144	0.0708 144	0.2188 858	0.0154 122	0.0704 122	0.2166 421	0.0152 106	0.0702 106
29	0.2116 794	0.0147 686	0.0697 686	0.2073 260	0.0143 854	0.0693 854	0.2051 254	0.0141 933	0.0691 933
30	0.2006 440	0.0138 054	0.0688 054	0.1963 768	0.0134 400	0.0684 400	0.1942 209	0.0132 569	0.0682 569
31	0.1901 839	0.0129 167	0.0679 167	0.1860 058	0.0125 680	0.0675 680	0.1838 961	0.0123 934	0.0673 934
32	0.1802 691	0.0120 952	0.0670 952	0.1761 825	0.0117 623	0.0667 623	0.1741 201	0.0115 956	0.0665 956
33	0.1708 712	0.0113 347	0.0663 347	0.1668 780	0.0110 167	0.0660 167	0.1648 639	0.0108 575	0.0658 575
34	0.1619 632	0.0106 296	0.0656 296	0.1580 649	0.0103 257	0.0653 257	0.1560 997	0.0101 736	0.0651 736
35	0.1535 196	0.0099 749	0.0649 749	0.1497 173	0.0096 844	0.0646 844	0.1478 014	0.0095 389	0.0645 389
36	0.1455 162	0.0093 663	0.0643 663	0.1418 104	0.0090 884	0.0640 884	0.1399 443	0.0089 493	0.0639 493
37	0.1379 301	0.0087 999	0.0637 999	0.1343 212	0.0085 340	0.0635 340	0.1325 048	0.0084 009	0.0634 009
38	0.1307 394	0.0082 722	0.0632 722	0.1272 275	0.0080 176	0.0630 176	0.1254 608	0.0078 903	0.0628 903
39	0.1239 236	0.0077 799	0.0627 799	0.1205 084	0.0075 361	0.0625 361	0.1187 913	0.0074 143	0.0624 143
40	0.1174 631	0.0073 203	0.0623 203	0.1141 441	0.0070 868	0.0620 868	0.1124 764	0.0069 702	0.0619 702
41	0.1113 395	0.0068 909	0.0618 909	0.1081 160	0.0066 672	0.0616 672	0.1064 971	0.0065 555	0.0615 555
42	0.1055 350	0.0064 893	0.0614 893	0.1024 062	0.0062 749	0.0612 749	0.1008 357	0.0061 679	0.0611 679
43	0.1000 332	0.0061 134	0.0611 134	0.0969 980	0.0059 079	0.0609 079	0.0954 753	0.0058 054	0.0608 054
44	0.0948 182	0.0057 613	0.0607 613	0.0918 753	0.0055 644	0.0605 644	0.0903 998	0.0054 661	0.0604 661
45	0.0898 751	0.0054 313	0.0604 313	0.0870 232	0.0052 425	0.0602 425	0.0855 941	0.0051 483	0.0601 483
46	0.0851 897	0.0051 218	0.0601 218	0.0824 274	0.0049 408	0.0599 408	0.0810 439	0.0048 505	0.0598 505
47	0.0807 485	0.0048 313	0.0598 313	0.0780 743	0.0046 577	0.0596 577	0.0767 356	0.0045 712	0.0595 712
48	0.0765 388	0.0045 585	0.0595 585	0.0739 510	0.0043 921	0.0593 921	0.0726 563	0.0043 092	0.0593 092
49	0.0725 487	0.0043 023	0.0593 023	0.0700 456	0.0041 427	0.0591 427	0.0687 939	0.0040 632	0.0590 632
50	0.0687 665	0.0040 615	0.0590 615	0.0663 463	0.0039 084	0.0589 084	0.0651 368	0.0038 321	0.0588 321
51	0.0651 815	0.0038 350	0.0588 350	0.0628 425	0.0036 881	0.0586 881	0.0616 741	0.0036 150	0.0586 150
52	0.0617 834	0.0036 219	0.0586 219	0.0595 237	0.0034 810	0.0584 810	0.0583 955	0.0034 109	0.0584 109
53	0.0585 625	0.0034 213	0.0584 213	0.0563 801	0.0032 862	0.0582 862	0.0552 912	0.0032 190	0.0582 190
54	0.0555 095	0.0032 325	0.0582 325	0.0534 026	0.0031 028	0.0581 028	0.0523 519	0.0030 384	0.0580 384
55	0.0526 156	0.0030 546	0.0580 546	0.0505 823	0.0029 302	0.0579 302	0.0495 689	0.0028 685	0.0578 685
56	0.0498 726	0.0028 870	0.0578 870	0.0479 110	0.0027 677	0.0577 677	0.0469 338	0.0027 085	0.0577 085
57	0.0472 726	0.0027 290	0.0577 290	0.0453 807	0.0026 146	0.0576 146	0.0444 388	0.0025 578	0.0575 578
58	0.0448 082	0.0025 801	0.0575 801	0.0429 841	0.0024 703	0.0574 703	0.0420 764	0.0024 159	0.0574 159
59	0.0424 722	0.0024 396	0.0574 396	0.0407 140	0.0023 343	0.0573 343	0.0398 396	0.0022 821	0.0572 821
60	0.0402 580	0.0023 071	0.0573 071	0.0385 638	0.0022 061	0.0572 061	0.0377 218	0.0021 560	0.0571 560
61	0.0381 593	0.0021 820	0.0571 820	0.0365 272	0.0020 852	0.0570 852	0.0357 165	0.0020 372	0.0570 372
62	0.0361 699	0.0020 640	0.0570 640	0.0345 982	0.0019 711	0.0569 711	0.0338 178	0.0019 251	0.0569 251
63	0.0342 843	0.0019 526	0.0569 526	0.0327 710	0.0018 635	0.0568 635	0.0320 200	0.0018 194	0.0568 194
64	0.0324 969	0.0018 474	0.0568 474	0.0310 403	0.0017 619	0.0567 619	0.0303 178	0.0017 196	0.0567 196
65	0.0308 028	0.0017 480	0.0567 480	0.0294 010	0.0016 660	0.0566 660	0.0287 061	0.0016 255	0.0566 255
66	0.0291 970	0.0016 541	0.0566 541	0.0278 483	0.0015 755	0.0565 755	0.0271 801	0.0015 367	0.0565 367
67	0.0276 748	0.0015 654	0.0565 654	0.0263 776	0.0014 901	0.0564 901	0.0257 352	0.0014 528	0.0564 528
68	0.0262 321	0.0014 816	0.0564 816	0.0249 845	0.0014 094	0.0564 094	0.0243 671	0.0013 737	0.0563 737
69	0.0248 645	0.0014 024	0.0564 024	0.0236 650	0.0013 331	0.0563 331	0.0230 718	0.0012 989	0.0562 989
70	0.0235 683	0.0013 275	0.0563 275	0.0224 153	0.0012 611	0.0562 611	0.0218 453	0.0012 283	0.0562 283
71	0.0223 396	0.0012 568	0.0562 568	0.0212 315	0.0011 931	0.0561 931	0.0206 840	0.0011 616	0.0561 616
72	0.0211 750	0.0011 898	0.0561 898	0.0201 102	0.0011 288	0.0561 288	0.0195 844	0.0010 987	0.0560 987
73	0.0200 711	0.0011 265	0.0561 265	0.0190 481	0.0010 680	0.0560 680	0.0185 433	0.0010 392	0.0560 392
74	0.0190 247	0.0010 667	0.0560 667	0.0180 422	0.0010 106	0.0560 106	0.0175 575	0.0009 829	0.0559 829
75	0.0180 329	0.0010 100	0.0560 100	0.0170 893	0.0009 563	0.0559 563	0.0166 242	0.0009 298	0.0559 298
76	0.0170 928	0.0009 565	0.0559 565	0.0161 868	0.0009 049	0.0559 049	0.0157 404	0.0008 796	0.0558 796
77	0.0162 017	0.0009 058	0.0559 058	0.0153 320	0.0008 564	0.0558 564	0.0149 037	0.0008 321	0.0558 321
78	0.0153 571	0.0008 578	0.0558 578	0.0145 223	0.0008 105	0.0558 105	0.0141 114	0.0007 872	0.0557 872
79	0.0145 565	0.0008 124	0.0558 124	0.0137 553	0.0007 671	0.0557 671	0.0133 612	0.0007 448	0.0557 448
80	0.0137 976	0.0007 695	0.0557 695	0.0130 289	0.0007 260	0.0557 260	0.0126 509	0.0007 047	0.0557 047
81	0.0130 783	0.0007 288	0.0557 288	0.0123 408	0.0006 872	0.0556 872	0.0119 784	0.0006 668	0.0556 668
82	0.0123 965	0.0006 904	0.0556 904	0.0116 891	0.0006 505	0.0556 505	0.0113 416	0.0006 309	0.0556 309
83	0.0117 502	0.0006 539	0.0556 539	0.0110 717	0.0006 158	0.0556 158	0.0107 387	0.0005 970	0.0555 970
84	0.0111 376	0.0006 195	0.0556 195	0.0104 870	0.0005 829	0.0555 829	0.0101 678	0.0005 650	0.0555 650
85	0.0105 570	0.0005 868	0.0555 868	0.0099 332	0.0005 518	0.0555 518	0.0096 273	0.0005 346	0.0555 346
86	0.0100 066	0.0005 559	0.0555 559	0.0094 086	0.0005 224	0.0555 224	0.0091 155	0.0005 060	0.0555 060
87	0.0094 850	0.0005 267	0.0555 267	0.0089 117	0.0004 946	0.0554 946	0.0086 309	0.0004 788	0.0554 788
88	0.0089 905	0.0004 990	0.0554 990	0.0084 411	0.0004 682	0.0554 682	0.0081 721	0.0004 532	0.0554 53[illegible]
89	0.0085 218	0.0004 727	0.0554 727	0.0079 953	0.0004 433	0.0554 433	0.0077 377	0.0004 289	0.0554 2[illegible]
90	0.0080 775	0.0004 479	0.0554 479	0.0075 730	0.0004 197	0.0554 197	0.0073 264	0.0004 059	0.0554 0[illegible]
91	0.0076 564	0.0004 244	0.0554 244	0.0071 731	0.0003 974	0.0553 974	0.0069 369	0.0003 846	0.0553 8[illegible]
92	0.0072 573	0.0004 021	0.0554 021	0.0067 943	0.0003 762	0.0553 762	0.0065 681	0.0003 636	0.0553 6[illegible]
93	0.0068 789	0.0003 810	0.0553 810	0.0064 356	0.0003 562	0.0553 562	0.0062 190	0.0003 448	0.0553 4[illegible]
94	0.0065 203	0.0003 610	0.0553 610	0.0060 956	0.0003 373	0.0553 373	0.0058 884	0.0003 2[illegible]	0.0553 2[illegible]
95	0.0061 804	0.0003 420	0.0553 420	0.0057 737	0.0003 194	0.0553 194	0.0055 753	0 0003 0[illegible]	0.0553 0[illegible]
96	0.0058 582	0.0003 241	0.0553 241	0.0054 688	0.0003 024	0.0553 024	0.0052 789	0.0002 919	0.0552 91[illegible]
97	0.0055 528	0.0003 071	0.0553 071	0.0051 799	0.0002 864	0.0552 864	0.0049 983	0.0002 763	0.0552 7[illegible]
98	0.0052 633	0.0002 910	0.0552 910	0.0049 064	0.0002 712	0.0552 712	0.0047 326	0.0002 615	0.0552 6[illegible]
99	0.0049 889	0.0002 758	0.0552 758	0.0046 473	0.0002 568	0.0552 568	0.0044 810	0.0002 476	0.0552 4[illegible]
100	0.0047 288	0.0002 613	0.0552 613	0.0044 018	0.0002 432	0.0552 432	0.0042 428	0.0002 343	0.0552 3[illegible]
	Ratio of Perpetual Ann.		0.0550 000	- - - - - - - - - -		0.0550 000	- - - - - - - - - -		0.0550 0[illegible]

RATE of INTEREST: 5¾ *per Cent. per Ann.*——CORRESPONDING VALUE of

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0575.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02875.			RATIO *of* INTEREST: *QUARTERLY*, 0.014375.		
	Improved Principal.	**Cumulated Annuity.**	**Value of Annuity.**	**Improved Principal.**	**Cumulated Annuity.**	**Value of Annuity.**	**Improved Principal.**	**Cumulated Annuity.**	**Value of Annuity.**
¼	....	....	....	....	....	....	1.0143 750	0.2500 000	0.2464 87
½	....	....	....	1.0287 500	0.5000 000	0.4860 27	1.0289 566	0.5035 938	0.4894 22
¾	....	....	....	....	....	....	1.0437 479	0.7608 329	0.7289 43
1	1.0575 000	1.0000 000	0.9456 27	1.0583 266	1.0143 750	0.9584 71	1.0587 518	1.0217 699	0.9650 70
¼	....	....	....	....	....	....	1.0739 713	1.2864 578	1.1978 51
½	....	....	....	1.0887 535	1.5435 383	1.4177 11	1 0894 097	1.5549 507	1.4273 23
¾	....	....	....	....	....	....	1.1050 699	1.8273 031	1 6535 63
2	1.1183 063	2.0575 000	1.8398 36	1.1200 551	2.0879 150	1.8641 18	1.1209 553	2.1035 706	1.8765 87
¼	....	....	....	....	....	....	1.1370 690	2.3838 094	2.0964 51
½	....	....	....	1.1522 567	2.6479 486	2.2980 49	1.1534 144	2.6680 766	2.3131 99
¾	....	....	....	....	....	....	1.1699 947	2.9564 302	2.5268 75
3	1.1826 089	3.1758 063	2.6854 24	1.1853 841	3.2940 709	2.7198 53	1.1868 134	3.2489 289	2.7375 23
¼	....	....	....	....	....	....	1.2038 739	3.5456 323	2.9451 86
½	....	....	....	1.2194 639	3.8167 630	3.1298 70	1.2211 795	3.8466 007	3.1499 65
¾	....	....	....	....	....	....	1.2387 349	4.1518 956	3.3517 25
4	1.2506 089	4.3584 151	3.4850 35	1.2545 235	4.4964 949	3.5284 27	1.2565 408	4.4615 791	3.5506 84
¼	....	....	....	....	....	....	1.2746 036	4.7757 143	3.7468 23
½	....	....	....	1.2905 910	5.0537 566	3.9156 47	1.2929 260	5.0913 652	3.9401 83
¾	....	....	....	....	....	....	1.3115 118	5.4175 967	4.1308 03
5	1.3225 189	5.6090 240	4.2411 66	1.3276 955	5.6990 522	4.2924 39	1.3303 646	5.7454 747	4.3187 21
¼	....	....	....	....	....	....	1.3494 888	6.0780 659	4.5039 76
½	....	....	....	1.3668 607	6.3628 999	4.6585 07	1.3688 877	6.4154 381	4.6866 66
¾	....	....	....	....	....	....	1.3885 654	6.7576 600	4.8666 48
6	1.3985 637	6.9315 429	4.9561 87	1.4051 354	7.0458 333	5.0143 45	1.4085 261	7.1048 914	5.0441 39
¼	....	....	....	....	....	....	1.4287 736	7.4569 329	5.2191 14
½	....	....	....	1.4465 331	7.7484 010	5.3602 38	1.4493 123	7.8141 263	5.3916 10
¾	....	....	....	....	....	....	1.4701 461	8.1764 544	5.5616 61
7	1.4789 811	8.3301 066	5.6323 28	1.4870 921	8.4711 075	5.6964 64	1.4912 795	8.5439 909	5.7293 02
¼	....	....	....	....	....	....	1.5127 166	8.9168 108	5.8945 68
½	....	....	....	1.5298 460	9.2147 136	6.0232 95	1.5344 619	9.2949 899	6.0574 91
¾	....	....	....	....	....	....	1.5565 198	9.6780 054	6.2181 66
8	1.5640 225	9.8090 877	6.2717 06	1.5738 991	9.9796 266	6.3409 91	1.5788 948	10.067 735	6.3764 45
¼	....	....	....	....	....	....	1.6015 914	10.462 459	6.5325 29
½	....	....	....	1.6190 707	10.766 561	6.6498 09	1.6246 143	10.862 857	6.6864 22
¾	....	....	....	....	....	....	1.6479 681	11.269 010	6.8381 24
9	1.6539 538	11.373 110	6.8763 17	1 6656 251	11.576 089	6.9499 97	1.6716 576	11.681 002	6.9876 76
¼	....	....	....	....	....	....	1.6956 877	12.098 917	7.1351 89
½	....	....	....	1.7135 119	12.408 902	7.2417 95	1.7200 632	12.522 839	7.2804 53
¾	....	....	....	....	....	....	1.7447 891	12.952 855	7.4237 36
10	1.7490 562	13.027 064	7.4480 54	1.7627 753	13.265 638	7.5254 39	1.7698 705	13.389 052	7.5649 90
¼	....	....	....	....	....	....	1.7953 124	13.831 520	7.7042 41
½	....	....	....	1.8134 551	14.147 046	7.8011 56	1.8211 200	14.280 348	7.8415 19
¾	....	....	....	....	....	....	1.8472 986	14.735 628	7.9768 52
11	1.8496 269	14.776 120	7.9887 03	1.8655 920	15.053 773	8.0691 67	1.8738 535	15.197 452	8.1102 67
¼	....	....	....	....	....	....	1.9007 901	15.665 916	8.2417 91
½	....	....	....	1.9192 277	15.986 569	8.3296 88	1.9281 140	16.141 113	8.3714 52
¾	....	....	....	....	....	....	1.9558 306	16.623 142	8.4992 74
12	1.9559 806	16.625 747	8.4999 56	1.9744 056	16.946 183	8 5829 29	1.9839 457	17.112 099	8.6252 86
¼	....	....	....	....	....	....	2.0124 649	17.608 086	8.7495 12
½	....	....	....	2.0311 697	17.933 386	8.8290 93	2.0413 941	18.111 202	8.8719 77
¾	....	....	....	....	....	....	2.0707 392	18.621 551	8.9927 07
13	2.0684 493	18.581 728	8.9834 10	2.0895 658	18.948 971	9.0683 77	2.1005 060	19.139 236	9.1117 26
¼	....	....	....	....	....	....	2.1307 008	19.664 362	9.2290 58
½	....	....	....	2.1496 408	19.993 754	9.3009 74	2.1613 296	20.197 037	9.3447 28
¾	....	....	....	....	....	....	2.1923 987	20.737 369	9.4587 58
14	2.1873 862	20.650 177	9.4405 77	2.2114 430	21.068 874	9.5270 71	2.2239 146	21.285 469	9.5711 72
¼	....	....	....	....	....	....	2.2558 832	21.841 448	9.6819 94
½	....	....	....	2.2750 220	22.174 295	9.7468 49	2.2883 116	22.405 419	9.7912 45
¾	....	....	....	....	....	....	2.3212 060	22.977 496	9.8989 87
15	2.3131 598	22.837 562	9.8728 86	2.3404 289	23.311 806	9.9604 85	2.3545 734	23.557 798	10.005 12
¼	....	....	....	....	....	....	2.3884 204	24.146 441	10.109 80
½	....	....	....	2.4077 162	24.482 021	10.168 15	2.4227 539	24.743 546	10.212 98
¾	....	....	....	....	....	....	2.4575 810	25.349 235	10.314 71
16	2.4461 665	25.150 722	10.281 69	2.4769 380	25.685 879	10.370 01	2.4929 087	25.963 630	10.414 99
17	2.5868 211	27.596 888	10.668 26	2.6214 098	28.198 423	10.756 97	2.6393 715	28.510 869	10.802 12
18	2.7355 633	30.183 710	11.033 82	2.7743 071	30 857 515	11.122 60	2.7944 393	31.207 640	11.167 76
19	2.8928 582	32.919 273	11.379 50	2.9361 289	33.671 703	11.468 08	2.9586 175	34.062 913	11.513 12
20	3.0591 975	35.812 131	11.706 38	3.1073 769	36.650 033	11.794 52	3.1324 415	37.085 940	11.839 31
21	3.2351 014	38.871 329	12.015 49	3.2886 195	39.802 078	12.102 97	3.3164 780	40.286 574	12.147 40
22	3.4211 197	42.106 430	12.307 79	3.4804 334	43.137 971	12.394 43	3.5113 270	43.675 261	12.438 29
23	3.6178 341	45.527 550	12.584 90	3.6834 351	46.668 436	12.669 81	3.7176 236	47.263 080	12.713 23
24	3.8258 596	49.145 384	12 845 58	3.8982 772	50.404 821	12.930 03	3.9360 406	51.061 575	12.972 63
25	4.0458 465	52.971 943	13.092 75	4.1256 503	54.359 135	13.175 90	4.1672 899	55.083 303	13.218 02

PERPETUAL STOCK: 3 *p. C.* 52,1739; 3½ *p. C.* 60,8696; 4 *p. C.* 69,5652; 5 *p. C.* 86,9565

	RATIO *of* INTEREST: *ANNUALLY*, 0.0575.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02875.			RATIO *of* INTEREST: *QUARTERLY*, 0.014375.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
	....	....	....	....	....	....	0.9858 287	4.0000 000	4.0575 000
	....	....	....	0.9720 535	2.0000 000	2.0575 000	0.9718 583	1.9857 276	2.0432 276
	....	....	....	....	....	....	0.9580 858	1.3143 409	1.3718 499
1	0.9456 265	1.0000 000	1.0575 000	0.9448 879	0.9858 287	1.0433 287	0.9445 083	0.9786 939	1.0361 939
	....	....	....	....	....	....	0.9311 235	0.7773 283	0.8348 283
	....	....	....	0.9184 816	0.6478 621	0.7053 621	0.9179 282	0.6431 072	0.7006 072
	....	....	....	....	....	....	0.9049 201	0.5472 546	0.6047 546
2	0.8942 094	0.4860 268	0.5435 268	0.8928 132	0.4789 467	0.5364 467	0.8920 963	0.4753 821	0.5328 821
	....	....	....	....	....	....	0.8794 541	0.4194 966	0.4769 966
	....	....	....	0.8678 621	0 3776 517	0.4351 517	0.8669 911	0.3748 018	0.4323 018
	....	....	....	....	....	....	0.8547 047	0.3382 458	0.3957 458
3	0.8455 881	0.3148 807	0.3723 807	0.8436 084	0.3101 669	0.3676 669	0.8425 924	0.3077 938	0.3652 938
	....	....	....	....	....	....	0.8306 518	0.2820 372	0.3395 372
	....	....	....	0.8200 325	0.2620 021	0.3195 021	0.8188 804	0.2599 698	0.3174 698
	....	....	....	....	....	....	0.8072 758	0.2408 538	0.2983 538
4	0.7996 106	0.2294 412	0.2869 412	0.7971 154	0.2259 123	0.2834 123	0.7958 357	0.2241 359	0.2816 359
	....	....	....	....	....	....	0.7845 577	0.2093 928	0.2668 928
	....	....	....	0.7748 388	0.1978 726	0.2553 726	0.7734 395	0.1962 953	0.2537 953
	....	....	....	....	....	....	0.7624 788	0.1845 847	0.2420 847
5	0.7561 329	0.1782 841	0.2357 841	0.7531 848	0.1754 678	0.2329 678	0.7516 735	0.1740 500	0.2315 500
	....	....	....	....	....	....	0.7410 213	0.1645 260	0.2220 260
	....	....	....	0.7321 359	0.1571 610	0.2146 610	0.7305 201	0.1558 740	0.2133 740
	....	....	....	....	....	....	0.7201 677	0.1479 820	0.2054 820
6	0.7150 192	0.1442 680	0.2017 680	0.7116 751	0.1419 279	0.1994 279	0.7099 620	0.1407 499	0.1982 499
	....	....	....	....	....	....	0.6999 009	0.1341 034	0.1916 034
	....	....	....	0.6917 863	0.1290 589	0.1865 589	0.6899 824	0.1279 734	0.1854 734
	....	....	....	....	....	....	0.6802 045	0.1223 024	0.1798 024
7	0.6761 412	0.1200 465	0.1775 465	0.6724 533	0,1180 475	0.1755 475	0.6705 651	0.1170 413	0.1745 413
	....	....	....	....	....	....	0.6610 623	0.1121 477	0.1696 477
	....	....	....	0.6536 605	0.1085 221	0.1660 221	0.6516 942	0.1075 848	0.1650 848
	....	....	....	....	....	....	0.6424 589	0.1033 207	0.1608 207
8	0.6393 770	0.1019 463	0.1594 463	0.6353 930	0.1002 040	0.1577 040	0.6333 544	0.0993 272	0.1568 272
	....	....	....	....	....	....	0.6243 790	0.0955 798	0.1530 798
	....	....	....	0.6176 360	0.0928 803	0.1503 803	0.6155 307	0.0920 568	0.1495 568
	....	....	....	....	....	....	0.6068 079	0.0887 389	0.1462 389
9	0.6046 118	0.0879 267	0.1454 267	0.6003 752	0.0863 850	0.1438 850	0.5982 066	0.0856 091	0.1431 091
	....	....	....	....	....	....	0.5897 312	0.0826 590	0.1401 590
	....	....	....	0.5835 967	0.0805 873	0.1380 873	0.5813 740	0.0798 541	0.1373 541
	....	....	....	....	....	....	0.5731 352	0.0772 031	0.1347 031
10	0.5717 369	0.0767 633	0.1342 633	0.5672 873	0.0753 896	0.1328 896	0.5650 131	0.0747 437	0.1322 437
	....	....	....	....	....	....	0.5570 061	0.0722 987	0.1297 987
	....	....	....	0.5514 335	0.0706 861	0.1281 861	0.5491 126	0.0700 263	0.1275 263
	....	....	....	....	....	....	0.5413 310	0.0678 627	0.1253 627
11	0.5406 496	0.0676 768	0.1251 768	0.5360 229	0.0664 285	0.1239 285	0.5336 596	0.0658 005	0.1233 005
	....	....	....	....	....	....	0.5260 970	0.0638 328	0.1213 328
	....	....	....	0.5210 429	0.0625 525	0.1200 525	0.5186 415	0.0619 536	0.1194 536
	....	....	....	....	....	....	0.5112 917	0.0601 571	0.1176 571
12	0.5112 526	0.0601 477	0.1176 477	0.5064 816	0.0590 103	0.1165 103	0.5040 461	0.0584 382	0.1159 382
	....	....	....	....	....	....	0.4969 031	0.0567 921	0.1142 921
	....	....	....	0.4923 272	0.0557 619	0.1132 619	0.4898 613	0.0552 144	0.1127 144
	....	....	....	....	....	....	0.4829 193	0.0537 012	0.1112 012
13	0.4834 539	0.0538 163	0.1113 163	0.4785 683	0.0527 733	0.1102 733	0.4760 757	0.0522 487	0.1097 487
	....	....	....	....	....	....	0.4693 291	0.0508 534	0.1083 534
	....	....	....	0.4651 940	0.0500 156	0.1075 156	0.4626 782	0.0495 122	0 1070 122
	....	....	....	....	....	....	0.4561 214	0.0482 223	0.1057 223
14	0.4571 669	0.0484 257	0.1059 257	0.4521 934	0.0474 641	0.1049 641	0.4496 576	0.0469 804	0.1044 804
	....	....	....	....	....	....	0.4432 854	0.0457 845	0.1032 845
	....	....	....	0.4395 562	0.0450 973	0.1025 973	0.4370 034	0.0446 320	0.1021 320
	....	....	....	....	....	....	0.4308 105	0.0435 209	0.1010 209
15	0.4323 091	0.0437 875	0.1012 875	0.4272 721	0.0428 907	0.1003 907	0.4247 054	0.0424 488	0.0999 488
	....	....	....	....	....	....	0.4186 868	0.0414 140	0.0989 140
	....	....	....	0.4153 313	0.0408 463	0.0983 463	0.4127 534	0.0404 146	0.0979 146
	....	....	....	....	....	....	0.4069 042	0.0394 489	0.0969 489
16	0.4088 029	0.0397 603	0.0972 603	0.4037 948	0.0389 319	0.0964 319	0.4011 378	0.0385 154	0.0960 154
17	0.3865 749	0.0362 360	0.0937 360	0.3814 742	0.0354 630	0.0929 630	0.3788 781	0.0350 744	0.0925 744
18	0.3655 554	0.0331 306	0.0906 306	0.3604 504	0.0324 070	0.0899 070	0.3578 525	0.0320 434	0.0895 434
19	0.3456 789	0.0303 773	0.0878 773	0.3405 852	0.0296 985	0.0871 985	0.3379 957	0.0293 574	0.0868 574
20	0.3268 831	0.0279 235	0.0854 235	0.3218 149	0.0272 851	0.0847 851	0.3192 398	0.0269 644	0.0844 644
21	0.3091 093	0.0257 259	0.0832 259	0.3040 790	0.0251 243	0.0826 243	0.3015 247	0.0248 222	0.0823 222
22	0.2923 019	0.0237 493	0.0812 493	0.2873 205	0.0231 814	0.0806 814	0.2847 926	0.0228 963	0.0803 963
23	0.2764 085	0.0219 647	0.0794 647	0.2714 858	0.0214 278	0.0789 278	0.2689 890	0.0211 582	0.0786 582
24	0.2613 792	0.0203 478	0.0778 478	0.2565 236	0.0198 394	0.0773 394	0.2540 624	0.0195 842	0.0770 842
25	0.2471 671	0.0188 782	0.0763 782	0.2423 860	0.0183 962	0.0758 962	0.2299 641	0.0181 543	0.0756 543

RATE of INTEREST: 5 ¾ *per Cent. per Ann.*——CORRESPONDING VALUE of

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0575.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02875.			RATIO *of* INTEREST: *QUARTERLY*, 0.014375.		
	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.	Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	4.2784 827	57.017 090	13.326 47	4.3662 853	58.544 092	13.408 22	4.4121 256	59.341 315	13.449 60
27	4.5244 954	61.295 573	13.547 49	4.6209 557	62.973 142	13.627 73	4.6713 458	63.849 492	13.668 33
28	4.7846 539	65.820 068	13.756 49	4.8904 801	67.660 524	13.835 15	4.9457 956	68.622 532	13 874 92
29	5.0597 715	70.604 722	13.954 13	5.1757 250	72.621 305	14.031 14	5.2363 698	73.675 997	14.070 05
30	5.3507 084	75.664 493	14.141 02	5.4776 073	77.871 431	14.216 32	5.5440 158	79.026 362	14.254 35
31	5.6583 741	81.015 202	14.317 75	5.7970 973	83.427 779	14.391 30	5.8697 365	84.691 070	14.428 43
32	5.9837 306	86.673 576	14.484 87	6.1352 221	89.308 210	14.556 64	6.2145 939	90 688 590	14.592 84
33	6.3277 951	92.657 307	14.642 91	6.4930 685	95.531 626	14.712 86	6.5797 123	97.038 475	14.748 13
34	6.6916 433	98.985 102	14.792 35	6.8717 868	102.11 803	14.860 48	6.9662 821	103.76 143	14.894 81
35	7.0764 128	105.67 674	14.933 66	7.2725 945	109.08 860	14.999 96	7.3755 635	110.87 936	15.033 34
36	7.4833 066	112.75 316	15.067 29	7.6967 800	116.46 574	15.131 75	7.8088 909	118.41 549	15.164 19
37	7.9135 967	120.23 646	15.193 66	8.1457 067	124.27 316	15.256 28	8.2676 770	126.39 438	15.287 78
38	8.3686 285	128.15 006	15.313 15	8.6208 178	132.53 596	15.373 94	8.7534 176	134.84 205	15.404 50
39	8.8498 247	136.51 869	15.426 15	9.1236 404	141.28 070	15.485 12	9.2676 964	143.78 602	15.514 75
40	9.3586 896	145.36 851	15.533 00	9.6557 910	150.53 550	15.590 18	9.8121 900	153.25 548	15.618 89
41	9.8968 142	154.72 720	15.634 04	10.218 980	160.33 009	15.689 44	10.388 673	163.28 128	15.717 24
42	10.465 881	164.62 402	15.729 59	10.815 018	170.69 597	15.783 23	10.999 026	173.89 611	15.810 14
43	11.067 669	175.08 990	15.819 94	11.445 821	181.66 645	15.871 86	11.645 239	185.13 459	15.897 88
44	11.704 060	186.15 757	15.905 38	12.113 416	193.27 681	15.955 60	12.329 417	197.03 334	15.980 75
45	12.377 044	197.86 163	15.986 18	12.819 950	205.56 435	16.034 72	13.053 792	209.63 117	16.059 02
46	13.088 724	210.23 867	16.062 58	13.567 694	218.56 859	16.109 48	13.820 725	222.96 914	16.132 95
47	13.841 325	223.32 740	16.134 83	14.359 051	232.33 132	16.180 13	14.632 717	237.09 074	16.202 78
48	14.637 201	237.16 872	16.203 15	15.196 565	246.89 678	16.246 89	15.492 416	252.04 201	16.268 73
49	15.478 841	251.80 592	16.267 75	16.082 928	262.31 180	16.309 95	16.402 622	267.87 169	16.331 02
50	16.368 874	267.28 476	16.328 84	17.020 990	278.62 592	16.369 55	17.366 305	284.63 140	16.389 86
51	17.310 084	283.65 364	16.386 61	18.013 766	295.89 158	16.425 86	18.386 607	302.37 577	16.445 44
52	18.305 414	300.96 372	16.441 24	19.064 447	314.16 430	16.479 07	19.466 852	321.16 265	16.497 92
53	19.357 975	319.26 913	16.492 90	20.176 411	333.50 280	16.529 34	20.610 564	341.05 329	16.547 50
54	20.471 059	338.62 711	19.541 75	21.353 231	353.96 924	16.576 85	21.821 471	362.11 254	16.594 32
55	21.648 145	359.09 817	16.587 94	22.598 692	375.62 943	16.621 73	23.103 521	384.40 907	16.638 53
56	22.892 913	380.74 631	16.631 62	23.916 796	398.55 298	16.664 14	24.460 894	408.01 555	16.680 32
57	24.209 256	403.63 923	16.672 93	25.311 781	422.81 358	16.704 22	25.898 015	433.00 895	16.719 77
58	25.601 288	427.84 848	16.711 99	26.788 130	448.48 921	16.742 09	27.419 569	459.47 076	16.757 04
59	27.073 362	453.44 977	16.748 93	28.350 589	475.66 242	16.777 87	29.030 517	487.48 725	16.792 23
60	28.630 080	480.52 313	16.783 86	30.004 182	504.42 055	16.811 68	30.736 111	517.14 976	16.825 48
61	30.276 310	509.15 321	16.816 88	31.754 222	534.85 604	16.843 62	32.541 912	548.55 500	16.856 88
62	32.017 197	539.42 952	16.848 12	33.606 337	567.06 673	16.873 80	34.453 807	581.80 534	16.886 53
63	33.858 186	571.44 672	16.877 65	35.566 479	601.15 616	16.902 32	36.478 029	617.00 920	16.914 54
64	35.805 032	605.30 491	16.905 58	37.640 950	637.23 391	16.929 27	38.621 178	654.28 136	16.941 00
65	37.863 821	641.10 994	16.931 99	39.836 417	675.41 595	16.954 74	40.890 240	693.74 331	16.965 99
66	40.040 991	678.97 376	16.956 97	42.159 938	715.82 501	16.978 80	43.292 614	735.52 373	16.989 59
67	42.343 348	719.01 475	16.980 58	44.618 982	758.59 100	17.001 53	45.836 132	779.75 882	17.011 88
68	44.778 091	761.35 810	17.002 92	47.221 454	803.85 138	17.023 01	48.529 086	826.59 280	17.032 94
69	47.352 831	806.13 619	17.024 03	49.975 719	851.75 164	17.043 31	51.380 255	876.17 836	17.052 82
70	50.075 619	853.48 902	17.044 00	52.890 631	902.44 576	17.062 49	54.398 936	928.67 715	17.071 60
71	52.954 967	903.56 464	17.062 89	55.975 560	956.09 670	17.080 61	57.594 970	984.26 035	17.089 34
72	55.999 877	956.51 961	17.080 74	59 240 422	1012.8 769	17.097 73	60.978 776	1043.1 092	17.106 10
73	59.219 870	1012.5 195	17.097 63	62.695 712	1072.9 689	17.113 91	64.561 387	1105.4 154	17.121 93
74	62.625 013	1071.7 394	17.113 60	66.352 538	1136.5 659	17.129 20	68.354 483	1171.3 823	17.136 88
75	66.225 951	1134.3 644	17.128 70	70.222 653	1203.8 722	17.143 64	72.370 430	1241.2 249	17.151 00
76	70.033 943	1200.5 903	17.142 98	74.318 499	1275.1 043	17.157 29	76.622 320	1315.1 708	17.164 32
77	74.060 895	1270.6 243	17.156 48	78.653 242	1350.4 912	17.170 19	81 124 017	1393.4 612	17.176 92
78	78.319 396	1344.6 852	17.169 25	83.240 815	1430.2 750	17.182 38	85.890 197	1476.3 512	17.188 82
79	82.822 762	1423.0 046	17.181 32	88.095 965	1514.7 124	17.193 89	90.936 398	1564.1 113	17.200 06
80	87.585 070	1505.8 273	17.192 74	93.234 300	1604.0 748	17.204 77	96.279 072	1657.0 273	17.210 67
81	92.621 212	1593.4 124	17.203 54	98.672 336	1698.6 493	17.215 05	101.93 564	1755.4 024	17.220 [illegible]
82	97.946 932	1686.0 336	17.213 75	104.42 755	1798.7 401	17.224 77	107.92 454	1859.5 572	17.230 [illegible]
83	103.57 888	1783.9 805	17.223 40	110.51 845	1904.6 688	17.233 94	114.26 529	1969.8 312	17.239 10
84	109.53 467	1887.5 594	17.232 53	116.96 462	2016.7 759	17.242 62	120.97 858	2086.5 840	17.247 55
85	115.83 291	1997.0 941	17.241 16	123.78 676	2135.4 219	17.250 81	128.08 629	2210.1 963	17.255 53
86	122.49 330	2112.9 270	17.249 33	131.00 682	2260.9 881	17.258 55	135.61 158	2341.0 710	17.263 06
87	129.53 667	2235.4 203	17.257 05	138.64 799	2393.8 782	17.265 87	143.57 900	2479.6 348	17.270 18
88	136.98 502	2364.9 570	17.264 35	146.73 485	2534.5 192	17.272 78	152.01 452	2626.3 395	17.276 90
89	144.86 166	2501.9 420	17.271 25	155.29 339	2683.3 634	17.279 31	160.94 565	2781.6 634	17.283 25
90	153.19 121	2616.8 036	17.277 78	164.35 112	2840.8 891	17.285 49	170.40 149	2946.1 128	17.289 25
91	161.99 970	2799.9 948	17.283 95	173.93 716	3007.6 028	17.291 32	180.41 288	3120.2 239	17.294 91
92	171.31 469	2961.9 946	17.289 79	184.08 232	3184.0 403	17.296 83	191.01 245	3304.5 644	17.300 26
93	181.16 528	3133.3 092	17.295 31	194.81 921	3370.7 688	17.302 04	202.23 477	3499.7 351	17.305 31
94	191.58 228	3314.4 745	17.300 53	206.18 234	3568.3 885	17 306 96	214.11 642	3706.3 725	17.310 08
95	202.59 827	3506.0 568	17.305 46	218.20 825	3777.5 347	17.311 61	226.69 614	3925.1 503	17.314 59
96	214.24 767	3708.6 551	17.310 13	230.93 558	3998.8 797	17.316 00	240.01 494	4156.7 815	17.318 84
97	226.56 691	3922.9 027	17.314 54	244.40 526	4233.1 350	17.320 15	254.11 624	4402.0 216	17.322 87
98	239.59 450	4149.4 696	17.318 72	258.66 058	4481.0 536	17.324 07	269.04 602	4661.6 699	17.326 66
99	253.37 119	4389.0 641	17.322 66	273.74 737	4743.4 324	17.327 77	284.85 295	4936.5 730	17.330 25
100	267.94 003	4642.4 358	17.326 40	289.71 411	5021.1 149	17.331 27	301.58 856	5227.6 272	17.333 64
	Value of Perpetual Ann.		17.391 30	. . . .		17.391 30	. . . .		17.391 30

PERPETUAL STOCK: 3 *p.C.* 52,1739; 3½ *p.C.* 60,8696; 4 *p.C.* 69,5652; 5 *p.C.* 86,9565.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.0575.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.02875.			RATIO *of* INTEREST: *QUARTERLY*, 0.014375.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.2337 277	0.0175 386	0.0750 386	0.2290 276	0.0170 811	0.0745 811	0.2266 481	0.0168 517	0.0743 517
27	0.2210 191	0.0163 144	0.0738 144	0.2164 055	0.0158 798	0.0733 798	0.2140 711	0.0156 618	0.0731 618
28	0.2090 015	0.0151 929	0.0726 929	0.2044 789	0.0147 797	0.0722 797	0.2021 919	0.0145 725	0.0720 725
29	0.1976 374	0.0141 634	0.0716 634	0.1932 096	0.0137 701	0.0712 701	0.1909 720	0.0135 729	0.0710 729
30	0.1868 911	0.0132 162	0.0707 162	0.1825 615	0.0128 417	0.0703 417	0.1803 746	0.0126 540	0.0701 540
31	0.1767 292	0.0123 434	0.0698 434	0.1725 001	0.0119 864	0 0694 864	0.1703 654	0.0118 076	0.0693 076
32	0.1671 198	0.0115 375	0.0690 375	0.1629 933	0.0111 972	0.0686 972	0.1609 116	0.0110 267	0.0685 267
33	0.1580 329	0.0107 925	0.0682 925	0.1540 104	0.0104 677	0.0679 677	0.1519 823	0.0103 052	0.0678 052
34	0.1494 401	0 0101 025	0.0676 025	0.1455 226	0.0097 926	0.0672 926	0.1435 486	0.0096 375	0.0671 375
35	0.1413 145	0.0094 628	0.0669 628	0.1375 025	0.0091 669	0.0666 669	0.1355 828	0.0090 188	0.0665 188
36	0.1336 308	0.0088 689	0.0663 689	0.1299 245	0.0085 862	0.0660 862	0.1280 592	0.0084 448	0.0659 448
37	0.1263 648	0.0083 169	0.0658 169	0.1227 641	0.0080 468	0.0655 468	0.1209 530	0.0079 117	0.0654 117
38	0.1194 939	0.0078 034	0.0653 034	0.1159 983	0.0075 451	0.0650 451	0.1142 411	0.0074 161	0.0649 161
39	0.1129 966	0.0073 250	0.0648 250	0.1096 054	0.0070 781	0.0645 781	0.1079 017	0.0069 548	0.0644 548
40	0.1068 526	0.0068 791	0.0643 791	0.1035 648	0.0066 430	0.0641 430	0.1019 140	0.0065 251	0.0640 251
41	0.1010 426	0.0064 630	0.0639 630	0.0978 571	0.0062 371	0.0637 371	0.0962 587	0.0061 244	0.0636 244
42	0.0955 486	0.0060 744	0.0635 744	0.0924 640	0.0058 584	0.0633 584	0.0909 171	0.0057 506	0.0632 506
43	0.0903 533	0.0057 114	0.0632 114	0.0873 681	0.0055 046	0.0630 046	0.0858 720	0.0054 015	0.0629 015
44	0.0854 404	0.0053 718	0.0628 718	0.0825 531	0.0051 739	0.0626 739	0.0811 068	0.0050 753	0.0625 753
45	0.0807 947	0.0050 540	0.0625 540	0.0780 034	0.0048 647	0.0623 647	0.0766 061	0.0047 703	0.0622 703
46	0.0764 016	0.0047 565	0.0622 565	0.0737 045	0.0045 752	0.0620 752	0.0723 551	0.0044 849	0.0619 849
47	0.0722 474	0.0044 777	0.0619 777	0.0696 425	0.0043 043	0.0618 043	0.0683 400	0.0042 178	0.0617 178
48	0.0683 191	0.0042 164	0.0617 164	0.0658 043	0.0040 503	0.0615 503	0.0645 477	0.0039 676	0.0614 676
49	0.0646 043	0.0039 713	0.0614 713	0.0621 777	0.0038 123	0.0613 123	0.0609 659	0.0037 331	0.0612 331
50	0.0610 916	0.0037 413	0.0612 413	0.0587 510	0.0035 890	0.0610 890	0.0575 828	0.0035 133	0.0610 133
51	0.0577 698	0.0035 254	0.0610 254	0.0555 131	0.0033 796	0.0608 796	0.0543 874	0.0033 071	0.0608 071
52	0.0546 286	0.0033 227	0.0608 227	0.0524 537	0.0031 830	0.0606 830	0.0513 694	0.0031 137	0.0606 137
53	0.0516 583	0.0031 322	0.0606 322	0.0495 628	0.0029 985	0.0604 985	0.0485 188	0.0029 321	0.0604 321
54	0 0488 495	0.0029 531	0.0604 531	0.0468 313	0.0028 251	0.0603 251	0.0458 264	0.0027 616	0.0602 616
55	0.0461 933	0.0027 848	0.0602 848	0.0442 503	0.0026 622	0.0601 622	0.0432 834	0.0026 014	0.0601 014
56	0.0436 816	0.0026 264	0.0601 264	0.0418 116	0.0025 091	0.0600 091	0.0408 816	0.0024 509	0.0599 509
57	0.0413 065	0.0024 775	0.0599 775	0 0395 073	0.0023 651	0.0598 651	0.0386 130	0.0023 094	0.0598 094
58	0.0390 605	0.0023 373	0.0598 373	0.0373 300	0.0022 297	0.0597 297	0.0364 703	0.0021 764	0.0596 764
59	0.0369 367	0.0022 053	0.0597 053	0.0352 726	0.0021 023	0.0596 023	0.0344 465	0.0020 513	0.0595 513
60	0.0349 283	0.0020 811	0.0595 811	0.0333 287	0.0019 825	0.0594 825	0.0325 350	0.0019 337	0.0594 337
61	0.0330 291	0.0019 640	0.0594 640	0.0314 919	0.0018 697	0.0593 697	0.0307 296	0.0018 230	0.0593 230
62	0.0312 332	0.0018 538	0.0593 538	0.0297 563	0.0017 635	0.0592 635	0.0290 244	0.0017 188	0.0592 188
63	0.0295 350	0.0017 499	0.0592 499	0.0281 164	0.0016 635	0.0591 635	0.0274 138	0 0016 207	0.0591 207
64	0.0279 290	0.0016 521	0.0591 521	0.0265 668	0.0015 693	0.0590 693	0.0258 925	0.0015 284	0.0590 284
65	0.0264 104	0.0015 598	0.0590 598	0.0251 027	0.0014 806	0.0589 806	0.0244 567	0.0014 415	0.0589 415
66	0.0249 744	0.0014 728	0.0589 728	0.0237 192	0.0013 970	0.0588 970	0.0230 986	0.0013 596	0.0588 596
67	0.0236 165	0.0013 908	0.0588 908	0.0224 120	0.0013 182	0.0588 182	0.0218 169	0.0012 824	0.0587 824
68	0.0223 323	0.0013 134	0.0588 134	0.0211 768	0.0012 440	0.0587 440	0.0206 062	0.0012 098	0.0587 098
69	0.0211 181	0.0012 405	0.0587 405	0.0200 097	0.0011 741	0.0586 741	0.0194 627	0.0011 413	0.0586 413
70	0.0199 698	0.0011 717	0.0586 717	0.0189 069	0.0011 081	0.0586 081	0.0183 827	0.0010 768	0.0585 768
71	0.0188 840	0.0011 067	0.0586 067	0.0178 649	0.0010 459	0.0585 459	0.0173 626	0.0010 160	0.0585 160
72	0.0178 572	0.0010 455	0.0585 455	0.0168 804	0.0009 873	0.0584 873	0.0163 991	0.0009 587	0.0584 587
73	0.0168 862	0.0009 876	0.0584 876	0.0159 501	0.0009 320	0.0584 320	0.0154 891	0.0009 046	0.0584 046
74	0.0159 681	0.0009 331	0.0584 331	0.0150 710	0.0008 798	0.0583 798	0.0146 296	0.0008 537	0.0583 537
75	0.0150 998	0.0008 816	0.0583 816	0.0142 404	0.0008 307	0.0583 307	0.0138 178	0.0008 057	0.0583 057
76	0.0142 788	0.0008 329	0.0583 329	0.0134 556	0.0007 842	0.0582 842	0.0130 510	0.0007 604	0.0582 604
77	0.0135 024	0.0007 870	0.0582 870	0.0127 140	0.0007 405	0.0582 405	0.0123 268	0.0007 176	0.0582 176
78	0.0127 682	0.0007 437	0.0582 437	0.0120 133	0.0006 992	0.0581 992	0.0116 428	0.0006 773	0.0581 773
79	0.0120 740	0.0007 027	0.0582 027	0.0113 513	0.0006 602	0.0581 602	0.0109 967	0.0006 393	0.0581 393
80	0.0114 175	0.0006 641	0.0581 641	0.0107 257	0.0006 234	0.0581 234	0.0103 865	0.0006 035	0.0581 035
81	0.0107 967	0.0006 276	0.0581 276	0.0101 346	0.0005 887	0.0580 887	0.0098 101	0.0005 697	0.0580 697
82	0.0102 096	0.0005 931	0.0580 931	0.0095 760	0.0005 559	0.0580 559	0.0092 657	0.0005 378	0.0580 378
83	0.0096 545	0.0005 605	0.0580 605	0.0090 483	0.0005 250	0.0580 250	0.0087 516	0.0005 077	0.0580 077
84	0.0091 295	0.0005 298	0.0580 298	0.0085 496	0.0004 958	0.0579 958	0.0082 659	0.0004 793	0.0579 793
85	0.0086 331	0.0005 007	0.0580 007	0.0080 784	0.0004 683	0.0579 683	0.0078 072	0.0004 524	0.0579 524
86	0.0081 637	0.0004 733	0.0579 733	0.0076 332	0.0004 423	0.0579 423	0.0073 740	0.0004 272	0.0579 272
87	0.0077 198	0.0004 473	0.0579 473	0 0072 125	0.0004 177	0.0579 177	0.0069 648	0.0004 033	0.0579 033
88	0.0073 001	0.0004 228	0.0579 228	0.0068 150	0.0003 946	0.0578 946	0.0065 783	0.0003 808	0.0578 808
89	0.0069 031	0.0003 997	0.0578 997	0.0064 394	0.0003 727	0.0578 727	0.0062 133	0.0003 595	0.0578 595
90	0.0065 278	0.0003 778	0.0578 778	0.0060 845	0.0003 520	0.0578 520	0.0058 685	0.0003 394	0.0578 394
91	0.0061 729	0.0003 571	0.0578 571	0.0057 492	0.0003 325	0.0578 325	0.0055 428	0.0003 205	0.0578 205
92	0.0058 372	0.0003 376	0.0578 376	0.0054 324	0.0003 141	0.0578 141	0.0052 353	0.0003 026	0.0578 026
93	0.0055 198	0.0003 192	0.0578 192	0 0051 330	0.0002 967	0.0577 967	0.0049 447	0.0002 857	0.0577 857
94	0.0052 197	0.0003 017	0.0578 017	0.0048 501	0.0002 802	0.0577 802	0.0046 704	0.0002 698	0.0577 698
95	0.0049 359	0.0002 852	0.0577 852	0.0045 828	0.0002 647	0.0577 647	0.0044 112	0.0002 546	0.0577 546
96	0.0046 675	0.0002 696	0.0577 696	0.0043 302	0.0002 501	0.0577 501	0.0041 664	0.0002 406	0.0577 406
97	0.0044 137	0.0002 549	0.0577 549	0.0040 916	0.0002 362	0.0577 362	0.0039 352	0.0002 272	0.0577 272
98	0.0041 737	0.0002 410	0.0577 410	0.0038 661	0.0002 232	0.0577 232	0.0037 168	0.0002 145	0.0577 145
99	.0039 468	0.0002 278	0.0577 278	0.0036 530	0.0002 108	0.0577 108	0.0035 106	0.0002 026	0.0577 026
100	.0037 322	0.0002 154	0.0577 154	0.0034 517	0.0001 992	0.0576 992	0.0033 158	0.0001 913	0.0576 913
Ratio of Perpetual Ann.			0.0575 000	- - - - - - - - - -		0.0575 000	- - - - - - - - - -		0.0575 000

26198 ICL

RATE of INTEREST: 6 *per Cent. per Ann.*——CORRESPONDING VALUE of

Year.	RATIO of INTEREST: *ANNUALLY*, 0.06. Improved Principal.	Cumulated Annuity.	Value of Annuity.	RATIO of INTEREST: *HALF-YEARLY*, 0.03. Improved Principal.	Cumulated Annuity.	Value of Annuity.	RATIO of INTEREST: *QUARTERLY*, 0.015. Improved Principal.	Cumulated Annuity.	Value of Annuity.
	....	....	....	....	....	....	1.0150 000	0.2500 000	0.2463 05
	....	....	....	1.0300 000	0.5000 000	0.4854 37	1.0302 250	0.5037 500	0.4889 71
	....	....	....	....	....	....	1.0456 784	0.7613 063	0.7280 50
1	1.0600 000	1.0000 000	0.9433 96	1.0609 000	1.0150 000	0.9567 35	1.0613 636	1.0227 258	0.9635 96
	....	....	....	....	....	....	1.0772 840	1.2880 667	1.1956 61
	....	....	....	1.0927 270	1.5454 500	1.4143 06	1.0934 433	1.5573 877	1.4248 97
	....	....	....	....	....	....	1.1098 449	1.8307 484	1.6495 58
2	1.1236 000	2.0600 000	1.8333 93	1.1255 088	2.0918 135	1.8585 49	1.1264 926	2.1082 096	1.8714 81
	....	....	....	....	....	....	1.1433 900	2.3898 399	2.0901 29
	....	....	....	1.1592 741	2.6545 679	2.2898 54	1.1605 408	2.6756 804	2.3055 46
	....	....	....	....	....	....	1.1779 489	2.9658 156	2.5177 79
3	1.1910 160	3.1836 000	2.6730 12	1.1940 523	3.2342 049	2.7085 96	1.1956 182	3.2603 028	2.7268 76
	....	....	....	....	....	....	1.2135 524	3.5592 074	2.9328 83
	....	....	....	1.2298 739	3.8312 311	3.1151 42	1.2317 557	3.8625 955	3.1358 45
	....	....	....	....	....	....	1.2502 321	4.1705 345	3.3358 08
4	1.2624 770	4.3746 160	3.4651 06	1.2667 701	4.4461 680	3.5098 46	1.2689 855	4.4830 924	3.5328 16
	....	....	....	....	....	....	1.2880 203	4.8003 388	3.7269 12
	....	....	....	1.3047 732	5.0795 530	3.8930 55	1.3073 406	5.1223 437	3.9181 49
	....	....	....	....	....	....	1.3269 507	5.4491 790	4.1065 42
5	1.3382 256	5.6370 930	4.2123 64	1.3439 164	5.7319 397	4.2651 01	1.3468 550	5.7809 168	4.2921 60
	....	....	....	....	....	....	1.3670 578	6.1176 305	4.4750 34
	....	....	....	1.3842 339	6.4038 983	4.6263 12	1.3875 637	6.4593 950	4.6552 06
	....	....	....	....	....	....	1.4083 772	6.8062 860	4.8327 15
6	1.4185 191	6.9753 186	4.9173 24	1.4257 609	7.0960 148	4.9770 02	1.4295 028	7.1583 800	5.0076 01
	....	....	....	....	....	....	1.4509 454	7.5157 560	5.1799 03
	....	....	....	1.4685 337	7.8088 950	5.3174 78	1.4727 095	7.8784 920	5.3496 58
	....	....	....	....	....	....	1.4948 002	8.2466 695	5.5169 04
7	1.5036 303	8.3938 376	5.5823 82	1.5125 897	8.5431 620	5.6480 37	1.5172 222	8.6203 695	5.6816 79
	....	....	....	....	....	....	1.5399 805	8.9996 750	5.8440 19
	....	....	....	1.5579 674	9.2994 570	5.9689 68	1.5630 802	9.3846 705	6.0039 59
	....	....	....	....	....	....	1.5865 264	9.7754 405	6.1615 38
8	1.5938 481	9.8974 679	6.2097 94	1.6047 064	10.078 441	6.2805 51	1.6103 243	10.172 072	6.3167 85
	....	....	....	....	....	....	1.6344 792	10.574 653	6.4697 38
	....	....	....	1.6528 476	10.880 794	6.5830 59	1.6589 964	10.983 273	6.6204 32
	....	....	....	....	....	....	1.6838 813	11.398 022	6.7688 98
9	1.6894 790	11.491 316	6.8016 91	1.7024 331	11.707 218	6.8767 57	1.7091 395	11.818 992	6.9151 71
	....	....	....	....	....	....	1.7347 767	12.246 278	7.0592 88
	....	....	....	1.7535 061	12.558 434	7.1619 00	1.7607 983	12.679 971	7.2012 63
	....	....	....	....	....	....	1.7872 101	13.120 168	7.3411 46
10	1.7908 477	13.180 795	7.3600 86	1.8061 112	13.435 187	7.4387 37	1.8140 184	13.566 973	7.4789 61
	....	....	....	....	....	....	1.8412 287	14.020 478	7.6147 40
	....	....	....	1.8602 946	14.338 243	7.7075 12	1.8688 471	14.480 785	7.7485 12
	....	....	....	....	....	....	1.8968 798	14.947 997	7.8803 08
11	1.8982 986	14.971 643	7.8868 74	1.9161 034	15.268 390	7.9684 58	1.9253 330	15.422 217	8.0101 55
	....	....	....	....	....	....	1.9542 130	15.903 550	8.1380 84
	....	....	....	1.9735 865	16.226 448	8.2218 04	1.9835 262	16.392 103	8.2641 22
	....	....	....	....	....	....	2.0132 791	16.887 985	8.3882 98
12	2.0121 965	16.869 941	8.3838 43	2.0327 941	17.213 235	8.4677 71	2.0434 783	17.391 305	8.5106 38
	....	....	....	....	....	....	2.0741 305	17.902 174	8.6311 71
	....	....	....	2.0937 779	18.229 638	8.7065 74	2.1052 424	18.420 707	8.7499 22
	....	....	....	....	....	....	2.1368 211	18.947 018	8.8669 18
13	2.1329 283	18.882 138	8.8526 82	2.1565 913	19.276 521	8.9384 21	2.1688 734	19.481 223	8.9821 85
	....	....	....	....	....	....	2.2014 665	20.023 441	9.0957 49
	....	....	....	2.2212 890	20.354 817	9.1635 16	2.2344 876	20.573 793	9.2076 35
	....	....	....	....	....	....	2.2679 440	21.132 400	9.3178 67
14	2.2609 040	21.015 066	9.2949 83	2.2879 277	21.465 461	9.3820 54	2.3019 631	21.699 385	9.4264 69
	....	....	....	....	....	....	2.3364 926	22.274 877	9.5334 67
	....	....	....	2.3565 655	22.609 425	9.5942 27	2.3715 400	22.859 000	9.6388 84
	....	....	....	....	....	....	2.4071 131	23.451 885	9.7427 43
15	2.3965 582	23.275 970	9.7122 48	2.4272 625	23.787 708	9.8002 21	2.4432 198	24.053 663	9.8450 67
	....	....	....	....	....	....	2.4798 681	24.664 468	9.9458 79
	....	....	....	2.5000 803	25.001 339	10.000 21	2.5170 661	25.284 435	10.045 20
	....	....	....	....	....	....	2.5548 221	25.913 701	10.143 06
16	2.5403 517	25.672 528	10.105 89	2.5750 827	26.251 379	10.194 38	2.5931 444	26.552 407	10.239 46
17	2.6927 728	28.212 880	10.477 26	2.7319 053	28.865 088	10.565 92	2.7522 690	29.204 488	10.611 06
18	2.8543 392	30.905 653	10.827 60	2.8982 783	31.637 972	10.916 13	2.9211 560	32.019 300	10.961 17
19	3.0255 996	33.759 992	11.158 12	3.0747 836	34.579 725	11.246 23	3.1004 106	35.006 843	11.291 03
20	3.2071 355	36.785 591	11.469 92	3.2620 378	37.700 630	11.557 39	3.2906 628	38.177 713	11.601 83
21	3.3995 636	39.992 727	11.764 08	3.4606 959	41.011 598	11.850 68	3.4925 895	41.543 159	11.894 66
22	3.6035 374	43.392 290	12.041 58	3.6714 523	44.524 204	12.127 14	3.7069 072	45.115 120	12.170 56
23	3.8197 497	46.995 828	12.303 38	3.8950 437	48.250 728	12.387 72	3.9343 762	48.906 270	12.430 50
24	4.0489 346	50.815 577	12.550 36	4.1322 519	52.204 198	12.633 35	4.1758 034	52.930 057	12.675 42
25	4.2918 707	54.864 512	12.783 36	4.3839 060	56.398 434	12.864 88	4.4320 456	57.200 761	12.906 18

PERPETUAL STOCK: 3 *p. C.* 50; 3½ *p. C.* 58,3333; 4 *p. C.* 66,6667; 5 *p. C.* 83,3333.

Year.	RATIO *of* INTEREST: *ANNUALLY*, 0.06.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.03.			RATIO *of* INTEREST: *QUARTERLY*, 0.015.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
¼	....	....	....	....	....	....	0.9852 217	4.0000 000	4.0600 000
½	....	....	....	0.9708 737	2.0000 000	2.0600 000	0.9706 618	1.9851 117	2.0451 117
¾	....	....	....	....	....	....	0.9563 170	1.3135 318	1.3735 318
1	0.9433 962	1.0000 000	1.0600 000	0.9425 960	0.9852 217	1.0452 217	0.9421 841	0.9777 792	1.0377 792
¼	....	....	....	....	....	....	0.9282 603	0.7763 573	0.8363 573
½	....	....	....	0.9151 417	0.6470 607	0.7070 607	0.9145 421	0.6421 008	0.7021 008
¾	....	....	....	....	....	....	0.9010 267	0.5462 247	0.6062 247
2	0.8899 964	0.4854 369	0.5454 369	0.8884 871	0.4780 541	0.5380 541	0.8877 111	0.4743 361	0.5343 361
¼	....	....	....	....	....	....	0.8745 922	0.4184 393	0.4784 393
½	....	....	....	0.8626 088	0.3767 092	0.4367 092	0.8616 672	0.3737 367	0.4337 367
¾	....	....	....	....	....	....	0.8489 332	0.3371 754	0.3971 754
3	0.8396 193	0.3141 098	0.3741 098	0.8374 843	0.3091 950	0.3691 950	0.8363 874	0.3067 200	0.3667 200
¼	....	....	....	....	....	....	0.8240 270	0.2809 614	0.3409 614
½	....	....	....	0.8130 915	0.2610 127	0.3210 127	0.8118 493	0.2588 933	0.3188 933
¾	....	....	....	....	....	....	0.7998 515	0.2397 774	0.2997 774
4	0.7920 937	0.2285 915	0.2885 915	0.7894 092	0.2249 128	0.2849 128	0.7880 310	0.2230 603	0.2830 603
¼	....	....	....	....	....	....	0.7763 853	0.2083 186	0.2683 186
½	....	....	....	0.7664 167	0.1968 677	0.2568 677	0.7649 116	0.1952 231	0.2552 231
¾	....	....	....	....	....	....	0.7536 074	0.1835 139	0.2435 139
5	0.7472 582	0.1773 964	0.2373 964	0.7440 939	0.1744 610	0.2344 610	0.7424 704	0.1729 829	0.2329 829
¼	....	....	....	....	....	....	0.7314 979	0.1634 620	0.2234 620
½	....	....	....	0.7224 213	0.1561 549	0.2161 549	0.7206 876	0.1548 133	0.2148 133
¾	....	....	....	....	....	....	0.7100 371	0.1469 230	0.2069 230
6	0.7049 606	0.1433 626	0.2033 626	0.7013 798	0.1409 242	0.2009 242	0.6995 439	0.1396 964	0.1996 964
¼	....	....	....	....	....	....	0.6892 058	0.1330 538	0.1930 538
½	....	....	....	0.6809 513	0.1280 591	0.1880 591	0.6790 205	0.1269 278	0.1869 278
¾	....	....	....	....	....	....	0.6689 857	0.1212 611	0.1812 611
7	0.6650 571	0.1191 350	0.1791 350	0.6611 178	0.1170 527	0.1770 527	0.6590 993	0.1160 043	0.1760 043
¼	....	....	....	....	....	....	0.6493 589	0.1111 151	0.1711 151
½	....	....	....	0.6418 620	0.1075 332	0.1675 332	0.6397 624	0.1065 568	0.1665 568
¾	....	....	....	....	....	....	0.6303 078	0.1022 972	0.1622 972
8	0.6274 124	0.1010 359	0.1610 359	0.6231 669	0.0992 217	0.1592 217	0.6209 929	0.0983 084	0.1583 084
¼	....	....	....	....	....	....	0.6118 156	0.0945 658	0.1545 658
½	....	....	....	0.6050 164	0.0919 051	0.1519 051	0.6027 741	0.0910 475	0.1510 475
¾	....	....	....	....	....	....	0.5938 661	0.0877 345	0.1477 345
9	0.5918 975	0.0870 222	0.1470 222	0.5873 946	0.0854 174	0.1454 174	0.5850 897	0.0846 096	0.1446 096
¼	....	....	....	....	....	....	0.5764 431	0.0816 575	0.1416 575
½	....	....	....	0.5702 860	0.0796 278	0.1396 278	0.5679 242	0.0788 645	0.1388 645
¾	....	....	....	....	....	....	0.5595 313	0.0762 185	0.1362 185
10	0.5583 948	0.0758 680	0.1358 680	0.5536 758	0.0744 314	0.1344 314	0.5512 623	0.0737 084	0.1337 084
¼	....	....	....	....	....	....	0.5431 156	0.0713 242	0.1313 242
½	....	....	....	0.5375 493	0.0697 435	0.1297 435	0.5350 893	0.0690 570	0.1290 570
¾	....	....	....	....	....	....	0.5271 815	0.0668 986	0.1268 986
11	0.5267 875	0.0667 929	0.1267 929	0.5218 925	0.0654 948	0.1254 948	0.5193 907	0.0648 415	0.1248 415
¼	....	....	....	....	....	....	0.5117 149	0.0628 790	0.1228 790
½	....	....	....	0.5066 918	0.0616 278	0.1216 278	0.5041 527	0.0610 050	0.1210 050
¾	....	....	....	....	....	....	0.4967 021	0.0592 137	0.1192 137
12	0.4969 694	0.0592 770	0.1192 770	0.4919 338	0.0580 948	0.1180 948	0.4893 617	0.0575 000	0.1175 000
¼	....	....	....	....	....	....	0.4821 297	0.0558 591	0.1158 591
½	....	....	....	0.4776 056	0.0548 557	0.1148 557	0.4750 047	0.0542 867	0.1142 867
¾	....	....	....	....	....	....	0.4679 849	0.0527 788	0.1127 788
13	0.4688 390	0.0529 601	0.1129 601	0.4636 947	0.0518 766	0.1118 766	0.4610 689	0.0513 315	0.1113 315
¼	....	....	....	....	....	....	0.4542 550	0.0499 415	0.1099 415
½	....	....	....	0.4501 891	0.0491 284	0.1091 284	0.4475 419	0.0486 055	0.1086 055
¾	....	....	....	....	....	....	0.4409 280	0.0473 207	0.1073 207
14	0.4423 010	0.0475 849	0.1075 849	0.4370 768	0.0465 865	0.1065 865	0.4344 118	0.0460 843	0.1060 843
¼	....	....	....	....	....	....	0.4279 919	0.0448 936	0.1048 936
½	....	....	....	0.4243 464	0.0442 293	0.1042 293	0.4216 669	0.0437 465	0.1037 465
¾	....	....	....	....	....	....	0.4154 354	0.0426 405	0.1026 405
15	0.4172 650	0.0429 628	0.1029 628	0.4119 868	0.0420 385	0.1020 385	0.4092 960	0.0415 737	0.1015 737
¼	....	....	....	....	....	....	0.4032 473	0.0405 442	0.1005 442
½	....	....	....	0.3999 871	0.0399 979	0.0999 979	0.3972 879	0.0395 500	0.0995 500
¾	....	....	....	....	....	....	0.3914 167	0.0385 896	0.0985 896
16	0.3936 463	0.0389 521	0.0989 521	0.3883 370	0.0380 932	0.0980 932	0.3856 322	0.0376 614	0.0976 614
17	0.3713 644	0.0354 448	0.0954 448	0.3660 449	0.0346 439	0.0946 439	0.3633 366	0.0342 413	0.0942 413
18	0.3503 438	0.0323 565	0.0923 565	0.3450 324	0.0316 076	0.0916 076	0.3423 300	0.0312 312	0.0912 312
19	0.3305 130	0.0296 209	0.0896 209	0.3252 262	0.0289 187	0.0889 187	0.3225 380	0.0285 658	0.0885 658
20	0.3118 047	0.0271 846	0.0871 846	0.3065 568	0.0265 248	0.0865 248	0.3038 902	0.0261 933	0.0861 933
21	0.2941 554	0.0250 045	0.0850 045	0.2889 592	0.0243 833	0.0843 833	0.2863 205	0.0240 714	0.0840 714
22	0.2775 051	0.0230 456	0.0830 456	0.2723 718	0.0224 597	0.0824 597	0.2697 666	0.0221 655	0.0821 655
23	0.2617 973	0.0212 785	0.0812 785	0.2567 365	0.0207 251	0.0807 251	0.2541 699	0.0204 473	0.0804 473
24	0.2469 786	0.0196 790	0.0796 790	0.2419 988	0.0191 555	0.0791 555	0.2394 748	0.0188 929	0.0788 929
25	0.2329 986	0.0182 267	0.0782 267	0.2281 071	0.0177 310	0.0777 310	0.2256 295	0.0174 823	0.0774 823

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.06. Improved Principal.	Cumulated Annuity.	Value of Annuity.	RATIO *of* INTEREST: *HALF-YEARLY*, 0.03. Improved Principal.	Cumulated Annuity.	Value of Annuity.	RATIO *of* INTEREST: *QUARTERLY*, 0.015. Improved Principal.	Cumulated Annuity.	Value of Annuity.
26	4.5493 830	59.156 383	13.003 17	4.6508 859	60.848 098	13.083 12	4.7040 116	61.733 527	13.123 59
27	4.8223 459	63.705 766	13.210 53	4.9341 248	65.568 746	13.288 83	4.9926 566	66.544 441	13.328 44
28	5.1116 867	68.528 112	13.406 16	5.2346 130	70.576 883	13.482 73	5.2990 342	71.650 570	13.521 44
29	5.4183 879	73.639 798	13.590 72	5.5534 010	75.890 016	13.665 50	5.6242 018	77.070 030	13.703 28
30	5.7434 912	79.058 186	13.764 83	5.8916 031	81.526 718	13.837 78	5.9693 228	82.822 047	13.874 61
31	6.0881 006	84.801 677	13.929 09	6.2504 017	87.506 695	14.000 17	6.3356 216	88.927 026	14.036 04
32	6.4533 867	90.889 778	14.084 05	6.6310 512	93.850 853	14.153 24	6.7243 978	95.406 630	14.188 13
33	6.8405 899	97.343 165	14.230 23	7.0348 822	100.58 137	14.297 52	7.1370 308	102.28 385	14.331 43
34	7.2510 253	104.18 375	14.368 14	7.4633 065	107.72 177	14.433 52	7.5740 843	109.58 307	14.466 44
35	7.6860 868	111.43 478	14.498 25	7.9178 219	115.29 703	14.561 71	8.0398 122	117.33 020	14.593 65
36	8.1472 520	119.12 087	14.620 99	8.4000 172	123.33 362	14.682 54	8.5331 637	125.55 273	14.713 50
37	8.6360 871	127.26 812	14.736 78	8.9115 783	131.85 964	14.796 44	9.0567 889	134.27 981	14.826 43
38	9.1542 523	135.90 421	14.846 02	9.4542 934	140.90 489	14.903 80	9.6125 456	143.54 243	14.932 82
39	9.7035 075	145.05 846	14.949 08	10.030 060	150.50 100	15.004 99	10.202 406	153.37 343	15.033 06
40	10.285 718	154.76 197	15.046 30	10.640 891	160.68 151	15.100 38	10.828 461	163.80 769	15.127 51
41	10.902 861	165.04 768	15.138 02	11.288 921	171.48 201	15.190 29	11.492 934	174.88 223	15.216 50
42	11.557 033	175.95 054	15.224 55	11.976 416	182.94 027	15.275 04	12.198 181	186.63 636	15.300 34
43	12.250 455	187.50 758	15.306 18	12.705 780	195.09 633	15.354 93	12.946 705	199.11 175	15.379 34
44	12.985 482	199.75 803	15.383 19	13.479 562	207.99 270	15.430 23	13.741 161	212.35 268	15.453 77
45	13.764 611	212.74 351	15.455 84	14.300 467	221.67 445	15.501 20	14.584 367	226.40 612	15.523 89
46	14.590 487	226.50 812	15.524 37	15.171 365	236.18 942	15.568 11	15.479 316	241.32 193	15.589 96
47	15.465 917	241.09 861	15.589 03	16.095 302	251.58 836	15.631 17	16.429 182	257.15 303	15.652 21
48	16.393 872	256.56 453	15.650 03	17.075 506	267.92 509	15.690 61	17.437 335	273.95 558	15.710 86
49	17.377 504	272.95 840	15.707 58	18.115 404	285.25 673	15.746 64	18.507 351	291.78 919	15.766 12
50	18.420 154	290.33 590	15.761 86	19.218 632	303.64 387	15.799 45	19.643 029	310.71 714	15.818 19
51	19.525 364	308.75 606	15.813 08	20.389 047	323.15 078	15.849 23	20.848 396	330.80 658	15.867 24
52	20.696 885	328.28 142	15.861 40	21.630 740	343.84 566	15.896 16	22.127 726	352.12 877	15.913 46
53	21.938 698	348.97 831	15.906 98	22.948 052	365.80 086	15.940 39	23.485 562	374.75 937	15.957 01
54	23.255 020	370.91 701	15.949 98	24.345 568	389.09 313	15.988 08	24.926 719	398.77 866	15.998 04
55	24.650 322	394.17 203	15.990 55	25.828 234	413.80 391	16.021 38	26.456 311	424.27 186	16.036 70
56	26.129 341	418.82 235	16.028 82	27.401 174	440.01 956	16.058 42	28.079 765	451.32 941	16.073 12
57	27.697 101	444.95 169	16.064 92	29.069 905	467.83 175	16.093 34	29.802 839	480.04 731	16.107 44
58	29.358 927	472.64 879	16.098 98	30.840 262	497.33 771	16.126 25	31.631 647	510.52 745	16.139 77
59	31.120 463	502.00 772	16.131 12	32.718 434	528.64 057	16.157 27	33.572 677	542.87 795	16.170 23
60	32.987 691	533.12 818	16.161 43	34.710 987	561.84 979	16.186 51	35.632 816	577.21 359	16.198 93
61	34.966 952	566.11 587	16.190 03	36.824 886	597.08 144	16.214 07	37.819 372	613.65 619	16.225 98
62	37.064 969	601.08 282	16.217 01	39.067 522	634.45 870	16.240 05	40.140 103	652.33 504	16.251 45
63	39.288 868	638.14 779	16.242 46	41.446 734	674.11 223	16.264 54	42.603 242	693.38 736	16.275 46
64	41.646 199	677.43 666	16.266 47	43.970 840	716.18 067	16.287 63	45.217 528	736.95 880	16.298 08
65	44.144 972	719.08 286	16.289 13	46.648 664	760.81 107	16.309 38	47.992 236	783.20 393	16.319 39
66	46.793 670	763.22 783	16.310 50	49.489 568	808.15 946	16.329 90	50.937 210	832.28 683	16.339 47
67	49.601 290	810.02 150	16.330 66	52.503 482	858.39 137	16.349 23	54.062 898	884.38 163	16.358 38
68	52.577 368	859.62 279	16.349 68	55.700 945	911.68 241	16.367 45	57.380 389	939.67 316	16.376 21
69	55.732 010	912.20 016	16.367 62	59.093 132	968.21 887	16.384 63	60.901 454	998.35 757	16.393 00
70	59.075 930	967.93 217	16.384 55	62.691 904	1028.1 984	16.400 82	64.638 583	1060.6 431	16.408 82
71	62.620 486	1027.0 081	16.400 52	66.509 841	1091.8 307	16.416 08	68.605 036	1126.7 506	16.423 78
72	66.377 715	1089.6 286	16.415 58	70.560 290	1159.3 382	16.430 46	72.814 885	1196.9 147	16.437 78
73	70.360 378	1156.0 063	16.429 79	74.857 412	1230.9 569	16.444 02	77.283 065	1271.3 844	16.451 01
74	74.582 001	1226.3 667	16.443 20	79.416 228	1306.9 371	16.456 80	82.025 428	1350.4 238	16.463 48
75	79.056 921	1300.9 487	16.455 85	84.252 676	1387.5 446	16.468 85	87.058 800	1434.3 133	16.475 22
76	83.800 336	1380.0 056	16.467 78	89.383 664	1473.0 611	16.480 20	92.401 037	1523.3 506	16.486 29
77	88.828 356	1463.8 059	16.479 04	94.827 130	1563.7 855	16.490 91	98.071 092	1617.8 515	16.496 72
78	94.158 058	1552.6 343	16.489 66	100.60 210	1660.0 350	16.501 00	104.08 908	1718.1 514	16.506 55
79	99.807 541	1646.7 924	16.499 68	106.72 877	1762.1 462	16.510 51	110.47 636	1824.6 060	16.515 81
80	105.79 599	1746.5 999	16.509 13	113.22 855	1870.4 759	16.519 47	117.25 558	1937.5 930	16.524 53
81	112.14 375	1852.3 959	16.518 05	120.12 417	1985.4 028	16.527 92	124.45 080	2057.5 133	16.532 74
82	118.87 238	1964.5 396	16.526 46	127.43 973	2107.3 289	16.535 89	132.08 754	2184.7 924	16.540 49
83	126.00 472	2083.4 120	16.534 40	135.20 081	2236.6 802	16.543 39	140.19 290	2319.8 817	16.547 78
84	133.56 500	2209.4 167	16.541 89	143.43 454	2373.9 090	16.550 47	148.79 564	2463.2 606	16.554 65
85	141.57 890	2342.9 817	16.548 96	152.16 971	2519.4 951	16.557 14	157.92 627	2615.4 378	16.561 13
86	150.07 364	2484.5 606	16.555 61	161.43 684	2673.9 473	16.563 43	167.61 718	2776.9 530	16.567 23
87	159.07 806	2634.6 343	16.561 90	171.26 834	2837.8 057	16.569 35	177.90 277	2948.3 794	16.572 98
88	168.62 274	2793.7 123	16.567 83	181.69 859	3011.6 431	16.574 93	188.81 951	3130.3 252	16.578 40
89	178.74 010	2962.3 351	16.573 42	192.76 403	3196.0 672	16.580 21	200.40 615	3323.4 358	16.583 50
90	189.46 451	3141.0 752	16.578 70	204.50 336	3391.7 227	16.585 17	212.70 378	3528.3 963	16.588 31
91	200.83 238	3330.5 397	16.583 68	216.95 761	3599.2 936	16.589 84	225.75 604	3745.9 340	16.592 84
92	212.88 232	3531.3 721	16.588 38	230.17 033	3819.5 055	16.594 26	239.60 923	3976.8 205	16.597 11
93	225.65 526	3744.2 544	16.592 81	244.18 771	4053.1 284	16.598 41	254.31 251	4221.8 751	16.601 13
94	239.19 458	3969.9 097	16.596 99	259.05 874	4300.9 790	16.602 33	269.91 802	4481.9 671	16.604 92
95	253.54 625	4209.1 042	16.600 94	274.83 541	4563.9 236	16.606 02	286.48 115	4758.0 192	16.608 40
96	268.75 903	4462.6 505	16.604 66	291.57 289	4842.8 815	16.609 51	304.06 065	5051.0 109	16.611 85
97	284.88 457	4731.4 095	16.608 17	309.32 968	5138.8 280	16.612 79	322.71 889	5361.9 816	16.615 08
98	301.97 765	5016.2 941	16.611 48	328.16 786	5452.7 976	16.615 88	342.52 207	5692.0 345	16.618 21
99	320.09 631	5318.2 718	16.614 60	348.15 328	5785.8 880	16.618 79	363.54 044	6042.3 407	16.620 88
100	339.30 208	5638.3 681	16.617 55	369.35 582	6139.2 636	16.621 54	385.84 857	6414.1 429	16.623 47
	Value of Perpetual Ann.		16.666 67	- - - - - - - - - -		16.666 67	- - - - - - - - - -		16.666 67

PERPETUAL STOCK: 3 p.C. 50; 3½ p.C. 58,3333; 4 p.C. 66,6667; 5 p.C. 83,3333.

Years.	RATIO *of* INTEREST: *ANNUALLY*, 0.06.			RATIO *of* INTEREST: *HALF-YEARLY*, 0.03.			RATIO *of* INTEREST: *QUARTERLY*, 0.015.		
	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.	Discounted Principal.	Annuity for Cumulation	Ratio of Annuity.
26	0.2198 100	0.0169 043	0.0769 043	0.2150 128	0.0164 344	0.0764 344	0.2125 845	0.0161 987	0.0761 987
27	0.2073 680	0.0156 972	0.0756 972	0.2026 702	0.0152 512	0.0752 512	0.2002 938	0.0150 279	0.0750 279
28	0.1956 301	0.0145 926	0.0745 926	0.1910 361	0 0141 689	0.0741 689	0.1887 136	0.0139 566	0.0739 566
29	0.1846 527	0.0135 796	0.0735 796	0.1800 698	0.0131 770	0.0731 770	0.1778 030	0.0129 752	0.0729 752
30	0.1741 181	0.0126 489	0.0726 489	0.1697 331	0.0122 659	0.0722 659	0.1675 232	0.0120 741	0.0720 741
31	0.1642 548	0.0117 922	0.0717 922	0.1599 897	0.0114 277	0.0714 277	0.1578 377	0.0112 452	0.0712 452
32	0.1549 574	0.0110 023	0.0710 023	0.1508 057	0.0106 552	0.0706 552	0.1487 122	0.0104 814	0.0704 814
33	0.1461 862	0.0102 729	0.0702 729	0.1421 488	0.0099 422	0.0699 422	0.1401 143	0.0097 767	0.0697 767
34	0.1379 115	0.0095 984	0.0695 984	0.1339 889	0.0092 832	0.0692 832	0.1320 135	0.0091 255	0.0691 255
35	0.1301 052	0.0089 739	0.0689 739	0.1262 973	0.0086 733	0.0686 733	0.1243 810	0.0085 230	0.0685 230
36	0.1227 408	0.0083 948	0.0683 948	0.1190 474	0.0081 081	0.0681 081	0.1171 898	0.0079 648	0.0679 648
37	0.1157 932	0.0078 574	0.0678 574	0.1122 135	0.0075 838	0.0675 838	0.1104 144	0.0074 471	0.0674 471
38	0.1092 389	0.0073 581	0.0673 581	0.1057 720	0.0070 970	0.0670 970	0.1040 307	0.0069 666	0.0669 666
39	0.1030 555	0.0068 938	0.0668 938	0.0997 003	0.0066 445	0.0666 445	0.0980 161	0.0065 200	0.0665 200
40	0.0972 222	0.0064 617	0.0664 617	0.0939 771	0.0062 235	0.0662 235	0.0923 492	0.0061 047	0.0661 047
41	0.0917 190	0.0060 589	0.0660 589	0.0885 824	0.0058 315	0.0658 315	0.0870 100	0.0057 181	0.0657 181
42	0.0865 274	0.0056 834	0.0656 834	0.0834 974	0.0054 663	0.0654 663	0.0819 794	0.0053 580	0.0653 580
43	0.0816 296	0.0053 331	0.0653 331	0.0787 043	0.0051 257	0.0651 257	0.0772 397	0.0050 223	0.0650 223
44	0.0770 091	0.0050 061	0.0650 061	0.0741 864	0.0048 079	0.0648 079	0.0727 741	0.0047 091	0.0647 091
45	0.0726 501	0.0047 005	0.0647 005	0.0699 278	0.0045 111	0.0645 111	0.0685 666	0.0044 168	0.0644 168
46	0.0685 378	0.0044 149	0.0644 149	0.0659 136	0.0042 339	0.0642 339	0.0646 023	0.0041 438	0.0641 438
47	0.0646 583	0.0041 477	0.0641 477	0.0621 299	0.0039 747	0.0639 747	0.0608 673	0.0038 887	0.0638 887
48	0.0609 984	0.0038 977	0.0638 977	0.0585 634	0.0037 324	0.0637 324	0.0573 482	0.0036 502	0.0636 502
49	0.0575 457	0.0036 636	0.0636 636	0.0552 016	0.0035 056	0.0635 056	0.0540 326	0.0034 271	0.0634 271
50	0.0542 884	0.0034 443	0.0634 443	0.0520 328	0.0032 933	0.0632 933	0.0509 086	0.0032 184	0.0632 184
51	0.0512 154	0.0032 388	0.0632 388	0.0490 459	0.0030 945	0.0630 945	0.0479 653	0.0030 229	0.0630 229
52	0.0483 164	0.0030 462	0.0630 462	0.0462 305	0.0029 083	0.0629 083	0.0451 922	0.0028 399	0.0628 399
53	0.0456 816	0.0028 655	0.0628 655	0.0435 767	0.0027 337	0.0627 337	0.0425 793	0.0026 684	0.0626 684
54	0.0430 015	0.0026 960	0.0626 960	0.0410 752	0.0025 701	0.0625 701	0.0401 176	0.0025 077	0.0625 077
55	0.0406 674	0.0025 370	0.0625 370	0.0387 173	0.0024 166	0.0624 166	0.0377 982	0.0023 570	0.0623 570
56	0.0382 712	0.0023 876	0.0623 876	0.0364 948	0.0022 726	0.0622 726	0.0356 128	0.0022 157	0.0622 157
57	0.0361 049	0.0022 474	0.0622 474	0.0343 998	0.0021 375	0.0621 375	0.0335 538	0.0020 831	0.0620 831
58	0.0340 612	0.0021 157	0.0621 157	0 0324 251	0.0020 107	0.0620 107	0.0316 139	0.0019 588	0.0619 588
59	0 0321 332	0.0019 920	0.0619 920	0.0305 638	0.0018 916	0.0618 916	0.0297 861	0.0018 420	0.0618 420
60	0.0303 143	0.0018 757	0.0618 757	0.0288 093	0.0017 798	0.0617 798	0.0280 640	0.0017 325	0.0617 325
61	0.0285 984	0.0017 664	0.0617 664	0.0271 555	0.0016 748	0.0616 748	0.0264 415	0.0016 296	0.0616 296
62	0.0269 797	0.0016 637	0.0616 637	0.0255 967	0.0015 761	0.0615 761	0.0249 127	0.0015 330	0.0615 330
63	0.0254 524	0.0015 670	0.0615 670	0.0241 274	0.0014 834	0.0614 834	0.0234 724	0.0014 422	0.0614 422
64	0.0240 118	0.0014 762	0.0614 762	0.0227 423	0.0013 963	0.0613 963	0.0221 153	0.0013 569	0.0613 569
65	0.0226 526	0.0013 907	0.0613 907	0.0214 368	0.0013 144	0.0613 144	0.0208 367	0.0012 768	0.0612 768
66	0.0213 704	0.0013 102	0.0613 102	0.0202 063	0.0012 374	0.0612 374	0.0196 320	0.0012 015	0.0612 015
67	0.0201 608	0.0012 345	0.0612 345	0.0190 464	0.0011 650	0.0611 650	0.0184 970	0.0011 307	0.0611 307
68	0.0190 196	0.0011 633	0.0611 633	0.0179 530	0.0010 969	0.0610 969	0.0174 276	0.0010 642	0 0610 642
69	0.0179 430	0.0010 963	0.0610 963	0.0169 224	0.0010 328	0.0610 328	0.0164 200	0.0010 016	0.0610 016
70	0.0169 274	0.0010 331	0.0610 331	0.0159 510	0.0009 726	0.0609 726	0.0154 706	0.0009 428	0.0609 428
71	0.0159 692	0.0009 737	0.0609 737	0.0150 354	0.0009 159	0.0609 159	0.0145 762	0.0008 875	0.0608 875
72	0 0150 653	0.0009 177	0.0609 177	0.0141 723	0.0008 626	0.0608 626	0.0137 335	0.0008 355	0.0608 355
73	0.0142 125	0.0008 650	0.0608 650	0.0133 587	0.0008 124	0.0608 124	0.0129 394	0.0007 865	0.0607 865
74	0.0134 081	0.0008 154	0.0608 154	0.0125 919	0.0007 651	0.0607 651	0.0121 913	0.0007 405	0.0607 405
75	0.0126 491	0.0007 687	0.0607 687	0.0118 691	0.0007 207	0.0607 207	0.0114 865	0.0006 972	0.0606 972
76	0.0119 331	0.0007 246	0.0607 246	0.0111 877	0.0006 789	0.0606 789	0.0108 224	0.0006 564	0.0606 564
77	0.0112 577	0.0006 832	0.0606 832	0.0105 455	0.0006 395	0.0606 395	0.0101 967	0.0006 181	0.0606 181
78	0.0106 204	0.0006 441	0.0606 441	0.0099 401	0.0006 024	0.0606 024	0.0096 072	0.0005 820	0.0605 820
79	0.0100 193	0.0006 072	0.0606 072	0.0093 695	0.0005 675	0.0605 675	0.0090 517	0.0005 481	0.0605 481
80	0.0094 522	0.0005 725	0.0605 725	0.0088 317	0.0005 346	0.0605 346	0.0085 284	0.0005 161	0.0605 161
81	0.0089 171	0.0005 398	0.0605 398	0.0083 247	0.0005 037	0.0605 037	0.0080 353	0.0004 860	0.0604 860
82	0.0084 124	0.0005 090	0.0605 090	0.0078 468	0.0004 745	0.0604 745	0.0075 707	0.0004 577	0.0604 577
83	0.0079 362	0.0004 800	0.0604 800	0.0073 964	0.0004 471	0.0604 471	0.0071 330	0.0004 311	0.0604 311
84	0.0074 870	0.0004 526	0.0604 526	0.0069 718	0.0004 212	0.0604 212	0.0067 206	0.0004 060	0.0604 060
85	0.0070 632	0.0004 268	0.0604 268	0.0065 716	0.0003 969	0.0603 969	0.0063 321	0.0003 823	0.0603 823
86	0.0066 634	0.0004 025	0.0604 025	0.0061 944	0.0003 740	0.0603 740	0.0059 660	0.0003 601	0.0603 601
87	0.0062 862	0.0003 796	0.0603 796	0.0058 388	0 0003 524	0.0603 524	0.0056 210	0.0003 392	0.0603 392
88	0.0059 304	0.0003 579	0.0603 579	0.0055 036	0.0003 320	0.0603 320	0.0052 961	0.0003 195	0.0603 195
89	0.0055 947	0.0003 376	0.0603 376	0.0051 877	0.0003 129	0.0603 129	0.0049 899	0.0003 009	0.0603 009
90	0.0052 780	0.0003 184	0.0603 184	0.0048 899	0.0002 948	0.0602 948	0.0047 014	0.0002 834	0.0602 834
91	0.0049 793	0.0003 003	0.0603 003	0.0046 092	0.0002 778	0.0602 778	0.0044 296	0.0002 670	0.0602 670
92	0.0046 974	0.0002 832	0.0602 832	0.0043 446	0.0002 618	0.0602 618	0.0041 735	0.0002 515	0.0602 515
93	0.0044 315	0.0002 671	0.0602 671	0.0040 952	0.0002 467	0.0602 467	0.0039 322	0.0002 369	0.0602 369
94	0.0041 807	0.0002 519	0.0602 519	0.0038 601	0.0002 325	0.0602 325	0.0037 048	0.0002 231	0.0602 231
95	0.0039 441	0.0002 376	0.0602 376	0.0036 385	0.0002 191	0.0602 191	0.0034 906	0.0002 102	0.0602 102
96	0.0037 208	0.0002 241	0.0602 241	0.0034 297	0.0002 065	0.0602 065	0.0032 888	0.0001 980	0.0601 980
97	0.0035 102	0.0002 114	0.0602 114	0.0032 328	0.0001 946	0.0601 946	0.0030 987	0.0001 865	0.0601 865
98	0.0033 115	0.0001 994	0.0601 994	0.0030 472	0.0001 834	0.0601 834	0.0029 195	0.0001 757	0.0601 757
99	0.0031 241	0.0001 880	0.0601 880	0.0028 723	0.0001 728	0.0601 728	0.0027 507	0.0001 655	0.0601 655
100	0.0029 472	0.0001 774	0.0601 774	0.0027 074	0.0001 629	0.0601 629	0.0025 917	0.0001 559	0.0601 559
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